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THE LIGNITIC STAGE

PART II

**Scaphopoda, GASTROPODA, Pteropoda
and Cephalopoda**

BY

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U. S. A.

THE LIGNITIC STAGE.

BY

Gilbert D. Harris.

PART II.

Scaphopoda, GASTROPODA, Pteropoda and Cephalopoda.

PRELIMINARY CONSIDERATIONS.

Part I, on the Lignitic Pelecypoda, was published as Bulletin No. 9 (June 15, 1897) and hence forms a part of volume 2. It would have been better, doubtless so far as convenience of reference is concerned, could the present work have followed as Bulletin No. 10, thus having a continuous pagination with No. 9. This, however, seemed impossible for want of time for its preparation during the fall of 1897; hence another took its place, and this is of necessity relegated to vol. 3.

The general plan and purpose of these publications has already been duly set forth. We may therefore proceed directly to the subject matter of this paper as designated by the above-given title.

Scaphopoda.

DENTALIUM.

Dentalium microstria,

Pl. 1, fig. 1, a.

Syn. *D. microstria* Heilp., Proc. Ac. Nat. Sci. Phila., 1880, p. 375, pl. 20, fig. 3.

D. microstria Ald., Bull. Am. Pal., vol. 1, p. 55, pl. 2, fig. 6.

Heilprin's original description.—"Shell slender, considerably curved and greatly attenuated, faintly striated, the striæ most conspicuous on the attenuated portion; posterior aperture entire, there being no fissure; anterior aperture circular.

"Length, $1\frac{1}{2}$ to 2 inches. Cave branch; Woods bluff,

Clarke Co., Ala."

This, as the figure shows is of a slender form, with surface nearly or quite smooth except at the smaller extremity, where five sometimes equal, but generally alternating longitudinal lines are found extending from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch from the apex. This posterior or lesser termination is usually not entire; but when intact it shows a comparatively shallow slit on the ventral or ex-curved side as indicated by pl. I, fig. 1, a.

When broken posteriorly an internal accessory tube is often seen projecting beyond the exterior shell.

Localities.—ALA.: Woods bluff; Cave branch, (Heilprin): Choctaw Corner; Bethel; 4 mi. S. of Mt. Sterling; Hendrick's marl bed; Butler; $\frac{1}{2}$ mi. S. of Butler (Aldrich); Hatchetigbee bluff; 4 miles N. of Hamilton bluff (Harris.)

Type.—

Specimen figured.—Woods bluff, Ala.; Paleont Mus., C. U.

Dentalium thalloides, Con.

Syn. *D. thalloide* Dall, Trans. Wag. Free Inst. Sci., vol. 3, pt. 2, p. 438, 1883.

Dall says (*op. cit.*): "*D. thalloide* Conrad (*D. alternatum* Lea) is very common in the Claibornian at Claiborne, near Clarksville and Woods bluff, Alabama, Wautubbee and Newton, Miss., and Creole Bluff, Louisiana."

Leaving aside the question as to whether "very common" applies to the Woods bluff locality or not, it seems to us doubtful whether this species has been found at this locality at all. Our enormous quantities of material from that outcrop fail to yield a single specimen; nor have Aldrich's researches brought any to light. The Eocene from Alabama collected by L. C. Johnson and now in the U. S. Nat. Museum was often improperly localized and this may account for the citation of the species at this locality.

Dentalium multannulatum,

Pl. I, fig. 2.

Syn. *D. multannulatum* Ald., Bull. Am. Pal., vol. 1, p. 55, pl. 2, fig. 3.

Aldrich's original description.—*Op. cit.*

Locality.—ALA.: Gregg's landing.

Specimen figured.—Aldrich's collection.

CADULUS.

Cadulus abruptus,

Pl. 1, fig. 3

Syn. *C. abruptus* Ald. & M., Jr. Cinn. Soc. Nat. Hist., vol. 9, p. 104, pl. 2, fig. 2, 1886.

C. subcoarctatus Ald., *partim*, Bull. Am. Pal., vol. 1, p. 56, pl. 2, fig. 2, 4?

Aldrich and Meyer's original description.—"Rather large, somewhat depressed. Inflation very near to the large aperture and suddenly decreasing. Newton, Wautubbee.

"The type specimen is from Newton. Form and position of the inflation distinguish it from other species of *Cadulus* of the southern Tertiary." Dall regards this the same as Gabb's *Ditrupa subcoarctata* from Texas, an older name than *abruptus*. Aldrich has accepted that view, (*loc. cit.*) though from what he says it seems that he may be mistaken as to the identification of *subcoarctatus*. While studying over the large amount of Eocene material of the Texan State survey we were led to consider the two species distinct. Dall very properly notes that the species "is notable for having the smaller end lightly longitudinally striated in most specimens." This is especially true of the Woods bluff forms, but was not observed by the writer in his Texas lower Claiborne specimens, nor on a good specimen from Gregg's landing.

Lignitic localities.—ALA.: Woods bluff, Gregg's landing; 4 miles above Hamilton bluff on the Alabama. From the last locality the specimen are exceedingly small and slender. $1\frac{1}{4}$ mi. W. S. W. of Choc-taw Corner, Ala.

Type.—Aldrich's collection.

Specimen figured.—Woods bluff; Paleont. Musuem, Cornell University.

GASTROPODA.

ACTÆON.

Actæon idoneus,

Pl. 1, fig. 4.

Syn. *A. idoneus* Con., Foss. Sh. Tert. Form., pt. 4, p. 45, Nov., 1833.

A. lineatus Lea, Cont. to Geol., p. 112, pl. 4, fig. 97, Dec., 1833.

A. punctatus Ald., Geol., Surv. Ala., Bull 1, p. 53, 1886.

Conrad's original description.—"Narrow-elliptical, with nar-

row transversely striated sulci, which are distant on the superior portion of the body whorl; fold on the columella elevated and very obtuse; labrum thickened." From the Claiborne sand bed.

In a forth-coming report we shall have more to say regarding the synonymy of *idoneus* and *pomilius* of Conrad and *lineatus* and *punctatus* of Lea. They all grade exceeding near to one another. Suffice it to say here that these Lignitic specimens vary somewhat in form, have an obtuse, not prominent fold, are marked exteriorly as follows—beginning with the suture of the body whorl and passing downwards: 1, two or three rather close-set revolving lines on the shoulder and near the suture; 2, one or two broad interspaces with the posterior termination of the mouth following the third of these lines with broad interspaces; 3, on the remaining and lower part of the whorl there are often about ten revolving lines usually decreasing in strength and width of interspace going downwards; often a fine secondary system of spiral lines is here visible. In the larger revolving lines there are microscopic transverse striations. Lines of growth practically invisible even under a glass. The arcuate form of the labrum and the occasional irregularities of growth show that such lines if visible would curve backward or to the right in passing over each whorl to the suture above.

Locality.—ALA.: Woods bluff.

Type.—Acad. Nat. Sci., Phila.

Specimen figured.—Woods bluff; Paleont. Mus., Cornell Univ.

"*Actæon*" *cossmanni*,

Pl. 1, fig. 5.

Syn. *A. cossmanni* Ald., Bull. Am. Pal., vol. 2, p. 176, pl. 3, fig. 5, 1897.

Aldrich's original description.—*Op. cit.*

I have not seen the type specimen, nor have any specimens of the species appeared in our collections. The straight columella, the pointed anterior portion of the aperture, the lack of any trace of a columellar fold, and the "shining" spiral surface are characters somewhat remarkable for this genus. See original description.

TORNATELLÆA.

Tornatellæa bella,

Pl. 1, fig. 6.

Syn. *Tornatellæa bella* Con., Jr. Ac. Nat. Sci. Phila., 2d, ser., vol. 4, p. 294, pl. 47, fig. 23, 1860.

T. (Tornatellæa) bella Heilp., Proc. Ac. Nat. Sci. Phila., 1880, p. 364, 366.

T. (Tornatellæa) bella Ald., Geol. Surv. Ala., Bull. 1, p. 53, 1886.

Conrad's original description.—(See Bull. Am. Pal., vol. 1, p. 188.)

Lignitic localities.—ALA.: Woods bluff; mouth of Bashi creek; Hatchetigbee bluff; $1\frac{1}{4}$ mi. W. S. W. of Choctaw Corner. Aldrich gives the following additional localities: Bethel; 4 mi. S. of Mt. Sterling; Hendrick's marl bed; $\frac{1}{2}$ mi. S. of Butler. Knight's branch, (Heilprin.)

Type.—Acad. Nat. Sci. Phila. Conrad's original label reads simply "*Tornatellæa bella* Con. Alab." Heilprin has improperly added "Claiborne."

Specimen figured.—Woods bluff; Pal. Mus., Cornell University.

VOLVARIA.

Volvaria (Volvariella) alabamensis,

Pl. 1, fig. 7.

Syn. *V. (Volvariella) alabamensis* Ald., Bull. Am. Pal., vol. 2, 179, pl. 3, fig. 3, 1897.

Aldrich's original description.—*Op. cit.*

Localities.—ALABAMA: Choctaw Corner,—Aldrich and C. W. Johnson.

Type.—Aldrich's collection.

TORNATINA.

Tornatina leai,

Pl. 1, fig. 8.

Syn. *Bullina leai* Ald., Bull. Amer. Pal., vol. 1, p. 59, pl. 3, fig. 6, 1895.

Tornatina leai Cossm., Rev. Bibliog. pour l'Annee, 1895, p. 34.

Aldrich's original description.—*Op. cit.*

The revolving lines on the posterior part of the body whorl are extremely minute, in fact scarcely more conspicuous than those on the middle portion of the shell. There is, however, a slight constriction about the shell which marks off this posterior portion definitely. The specimen figured pl. 3, fig. 6, shows more or less of a collosity near the anterior portion of the labium, but in the specimen herewith figured this is much less marked.

Localities.—ALA.: Bell's landing; Yellow bluff.

Types and specimen figured.—Bell's landing; Aldrich's collection.

SCAPHANDER.

Scaphander alabamensis,

Pl. 1, fig. 9.

Syn. *S. alabamensis* Ald., Bull. Am. Pal., vol. 1, p. 58, pl. 3, fig. 2, 1895.

Aldrich's original description.—*Op. cit.*

We are able to add little to Aldrich's remarks, which see. The obliquity of the growth lines is rather noteworthy however. It lacks the strong, sharply incised spiral lines of *ligniticus*, though faint ones are numerous. Our figure of the shell is taken from a slightly different standpoint than that given on pl. 3, vol. 1.

Locality.—ALA.: Gregg's landing.

Type.—Aldrich's collection.

Specimen figured.—Aldrich's collection.

Scaphander ligniticus,

Pl. 1, fig. 10.

Syn. *S. ligniticus* Ald., Bull. Am. Pal., vol. 2, p. 177, pl. 3, fig. 4, 1897.

Aldrich's original description.—(*Op. cit.*)

We have not seen Aldrich's type of this specimen but we have several very good specimens, young and old, belonging to it. A smooth shining, porcelaneous incrustation is found covering the specimens from 4 miles above Hamilton bluff.

Localities.—ALA.: Woods bluff; $1\frac{1}{4}$ mi. W. S. W. of Choctaw Corner; 4 mi. above Hamilton bluff.

Type and specimen figured.—Not in the type lot of Lignitic Eocene material sent by Aldrich. He mentions, *loc. cit.*, a specimen in the National Museum.

ATYS.

Atys robustoides,

Pl. 1, fig. 11.

Syn. *A. robustoides* Ald., Bull. Am. Pal., vol. 1, p. 58, pl. 3, fig. 4, 4a, 1895.

Aldrich's original description.—*Op. cit.*

Locality.—ALA.: Gregg's landing.

Type and specimen figured.—Aldrich's collection.

CYLICHNA.

Cylichna sylværupis, n. sp.,

Pl. 1, fig. 12.

Syn. *C. galba* Ald. non. Con., Geol. Sur. Ala., Bull. No. 1, p. 53, 1886.

Specific description.---Form and size as indicated by the figure; surface more or less spirally striate above, medially nearly smooth or microscopically striate, below with striæ becoming coarser and deeper to base; spire involute; posterior narrowing; columellar collosity depressed medially forming on either side low faint ridges or folds as in *Cylichnella*, the lower after curving down-

ward becoming confluent with the anterior margin of the labrum, the upper becoming obsolete at the outer margin of the labium.

Differs from *galba* in its more constricted posterior; presence of striation above or on the posterior; presence of a depression (bounded by incipient columellar folds) where in *galba* a large obtuse fold is found.

Localities.—ALA.: Woods bluff, Gregg's landing, and according to Aldrich, at Bell's landing also.

Type and specimen figured.—From Woods bluff; Paleont. Museum, Cornell University.

***Cylichna aldrichi*,**

Pl. I, fig. 13.

Syn. *Bulla* (*Haminea*) *aldrichi*, Lang., Am. Jr. Sci., 3d ser., vol. 31, p. 209, 1886.

Cylichna aldrichi Ald., Bull. Am. Pal., vol. 2, p. 173, pl. 5, fig. 5, 1897.

Langdon's original description.—"Shell elongate oval, substance rather thin, punctate-striate, striæ about 20, transverse; spire involute; labrum sharp and slightly dentate; mouth longitudinal and rather larger at base than at top; columella very slightly thickened at the base. Height .2; Breadth .1.

Resembles *B. glaphyra* Desh., but differs in the striæ which are in *B. aldrichi* from the top to the bottom, while in *B. glaphyra* Desh., they are confined to the upper and lower thirds of the shell."

Langdon gives no locality under this description but Aldrich says of the specimen he figures "from Choctaw Corner, Ala., where it is rather common."

Localities.—ALA.: Woods Bluff; 4 miles above Hamilton bluff, Alabama river; 3 miles S. W. of Thomasville, Ala.

Type.—Aldrich's collection?

Specimen figured.—The figure is a reprint of fig. 5, pl. 5, vol. 2.

RINGICULA.

***Ringicula butleriana* var. *lignitifera*.**

Pl. I, fig. 14.

Syn. *R. butleriana* var. *lignitifera* Ald., Bull. Am. Pal., vol. 2, p. 176, pl. 3, fig. 9, 1897.

Aldrich's original description.—*Op. cit.*

Our specimens from 4 miles above Hamilton bluff on the Alabama are much smaller than the dimensions indicated by

the figure but seem to agree very well in other respects with this variety.

Ringicula butleriana,

Pl. I, fig. 15.

Syn. *R. butleriana* Ald., Bull. Am. Pal., vol. 1, p. 59, pl. 2, fig. 8, 1895.

Aldrich's original description.—*Op. cit.*

The specimens in our collections belonging to this species, if the smoothness of the labrum is taken solely into account, are from Woods bluff. But the height of the spire indicates a close affinity and probable identity with var. *lignitifera* Ald.

Type.—The type specimen in Aldrich's collection is labelled "½ mi. S. of Butler, Ala.; W. B. Gr."

PHILINE.

Philine alabamensis,

Pl. I, fig. 16.

Syn. *P. alabamensis* Ald., Bull. Am. Pal., vol. 2, p. 176, pl. 6, fig. 6, 1897.

Aldrich's original description.—*Op. cit.*

Our specimens were obtained from 1¼ mile W. S. W. of Choctaw Corner and hence probably from the same locality as Aldrich's type. In ours however the posterior constriction is much more plainly marked than the figure would indicate, it being that of Aldrich's type by Dr. McConnell.

UMBRELLA.

Umbrella sylværupis, n. sp.

Pl. I, fig. 17, a, b.

Specific characterization.—Size and general form as indicated by the figures; muscular marking but slightly impressed in an arc of about 50° above, as oriented on the plate, the same space as viewed from the exterior being slightly depressed; two radiating depressions on the opposite side of the beak enclose an angle of about 30°.

This is smaller, and less circular in outline than *U. planulata* Con. from the Jackson beds.

Locality.—ALA.: Woods bluff.

Type.—Woods bluff, Ala.; Paleont Musuem, Cornell University.

PLEUROTOMA.

Pleurotoma mediavia, var., Pl. 1, fig. 18.

Syn. *P. mediavia* Har., Bull. Am. Pal., vol. 1, p. 193, pl. 17, fig. 16.

Harris' original description. Loc. cit.

Reference was made in the original description to a form of the Lignitic stage at Woods bluff which seemed very nearly allied to the Midway type. The differences between the two are chiefly: the larger size of the Lignitic form, its less number of revolving striæ and its rather more pronounced costæ and a slightly raised spiral band below the suture. The two can however be referred with safety to the same species. The costæ are figured too strongly developed for the majority of specimens in our collections.

Localities.—ALA.: Woods bluff, abundant; 3 mi. S. W. of Thomasville.

Figured specimen.—Paleontological Museum, Cornell Univ.

Pl. mediavia, var. *equiseta*, n. var., Pl. 1, fig. 19.

Differs from *mediavia* by its greater size, its very much finer costations, especially on the 4th embryonic whorl, its coarser spiral lines which are more or less alternate in size and are strangely granular like the exterior of "rushes"; the carination on the upper whorls especially in the upper spirals is lower down than in *mediavia*. Yet the two forms have a very similar general appearance.

This form is most strikingly similar to *P. wateleti* Desh., of the Sables inférieurs at Cuise-la-Motte. So far as can be judged from Deshayes' description and figure the only points of variance are the proportion of the body whorl to the remainder of the shell, and its size. Our shell is not 51 mm. long nor is the body whorl proportionally so large.

Localities.—ALA.: Woods bluff; Hatchetigbee.

Type.—Woods bluff; Paleont. Mus., Cornell University.

Pleurotoma moniliata, Pl. 1, fig. 20.

Syn. *P. moniliata* Heilp., Proc. Ac. Nat. Sci. Phila., 1880, p. 373, pl. 20, fig. 9.

P. moniliata Ald., Geol. Sur. Ala., vol. 1, 1886, p. 52.

Heilprins' original description.—"Shell fusiform, elevated, of about eight volutions, the whorls considerably contracted above the shoulder; whorls ornamented with a double series of nodes, the lower much the most strongly developed, which gives to the upper portion of the spire a moniliform appearance; surface of entire shell traversed by fine revolving lines, which become more distant, very prominent, and alternate on the median portion of the body-whorl; aperture about the length of spire; the relative position of the upper and lower nodes correspond to the sinuous lines of growth.

"Length, 1 inch. Cave branch, Clarke Co., Ala."

In rare instances the costation of the body whorl resembles that of *mediavia*, or *childreni*.

Localities.—ALA.: As above, and especially Woods bluff.

Type.—

Specimen figured.—Woods bluff; Paleont. Mus., Cornell Univ.

Pleurotoma denticula, var.,

Pl. 1, fig. 21, 22.

Syn. *P. denticula* Edw., Paleont. Soc. Lond., vol. XXI, p. 286, pl. 30, fig. 7, a-h, 1860.

? *P. denticula* Bast., Descr. Geol. du Bass. Tert. Sud-ouest de la France, p. 63, pl. 3, fig. 12, 1825.—*Fide* Edw.

P. alternata Con., Foss. Sh. Tert. Form., p. 46, 1833, 2d ed. p. 50, pl. 17, fig. 13, 1835.

P. childreni Lea, Cont. to Geol. p. 137, pl. 4, fig. 132, 1833.

P. acutirostra Con., Foss. Sh. Tert. Form., p. 52, pl. 17, fig. 21, 1835.

P. plebeia Dixon, Geol. Sussex, p. 184, pl. 6, fig. 23, 1850.

P. denticula Heilp., Proc. Ac. Nat. Sci. Phila., 1879, p. 214, p. 13, fig. 10.

P. denticula Meyer, Proc. Ac. Nat. Sci. Phila., 1884, p. 106.

Not having Basterot's original description, or specimens from his type locality it is impossible at present to say from personal observation whether our specimens can be referred to his species or not. On the other hand it seems quite safe to say that ours and some of the varieties referred to *denticula* by Edwards from the English Eocene are the same. My foreign specimens are from the Barton beds of southern England and Alum bay, Isle of Wight, and are considerably shorter proportionally than are the American, but on the whole the differences seem to be of

degree and not of total absence of features in one and not in the other. De Gregorio speaks (Mon. Faun. Eoc. Ala., p. 25) of the apparent identity of *childreni* and *denticula*. Cossmann admits that the two belong to the same section but notes the more distant crenulations of the latter. This distinction does not however hold when the Lignitic Eocene specimens are taken into consideration. Dixon's figure of *plebeia* is a splendid representation of some of our Lignitic forms. Heilprin remarks that Gabb's *nodocarinata* from Texas belongs to this species. This however is a mistake and has already been accounted for (Proc. Ac. Nat. Sci. Phila., 1895, p. 59).

Strangely enough neither Meyer nor Heilprin mention the identity of *childreni* and *denticula*, but Meyer regards the latter as equivalent to *P. baumonti* Lea. *P. baumonti* is probably but a well marked variety of *denticula* or *childreni*, but with its one spiral passing through oblique nodules it varies considerably from *denticula*. A variety of the same has recently been figured by Vaughan as *P. learchi* (Bull. Geol. Surv. No. 142, pl. 2, fig. 1, 1896). Gregorio's comparing *childreni* with *nupera* Con. and *terebratis* Lam. is inexcusable.

Other forms will be noted in our monographs on the Lower Claiborne and Claiborne stages. When all available American material has been worked over several varietal names can well be given to this variable species.

Lignitic localities.—ALA.: Woods bluff, Gregg's landing.

Specimen figured.—Pl. 1, fig. 21, Woods bluff; fig. 22. Gregg's landing; Paleontological Museum, Cornell Univ.

***Pleurotoma nebulosa*, n. sp.,**

Pl. 2, fig. 1.

Specific characterization.—Size and general form as indicated by the figure; whorls 9; 1, 2, and 3, smooth, small; 4, $4\frac{1}{2}$ faintly plicate longitudinally above but more strongly so below; remaining whorls ornamented by ribs strongest in a medial portion of the whorl, slightly obliquely set, extending faintly to the left and above to the sub-sutural band where a nodular enlargement takes place; above, the ribs extend nearly from suture to suture, below, they are more limited and sometimes nearly vanish on the

body whorl; ribs more or less angular centrally, giving the whorl a carinated appearance, crossed by many faint revolving lines above the carina, and by much coarser ones on the carina and below; lines of growth nearly obliterated by the spirals; mouth about one half the length of the whole shell.

It is with great reluctance that we propose a new name for this seemingly common type of *Pleurotoma*. Small specimens of this genus with two rows of nodules, one sub-sutural, the other carinal are common indeed in our Claiborne and other Eocene deposits; great variation moreover is shown among different specimens of this form; but it will be observed that the variation from the type specimen figured is toward the *moniliata* style of ornamentation; the great length of mouth in proportion to the height of spire, the coarseness and central carination of the ribs, the convex rather than concave sides of the spire, and other less noticeable features are not at all in harmony with the Claibornian *rugosa* Lea, *nupera* Con., etc., etc.

Localities.—ALA.: Woods bluff ;3 mi. S. W. of Thomasville.

Type and specimen figured.—Woods bluff: Paleontological Museum, Cornell Univ.

***Pleurotoma vauhani* var. *sylværupis*,**

Pl. 2, fig. 2.

Syn. *Pl. vauhani* Har., Proc. Ac. Nat. Sci. Phila., 1895, p. 57, pl. 4, fig. 8.

Pl. vauhani Har., Proc. Acad. etc., 1896, p. 475, pl. 20, fig. 9.

Harris' original description of vauhani.---"Size and general form as indicated by the figure; whorls about 11; 1, 2, 3 smooth and very small, 4 nodular, 5 nodular and with a subsutural line or band; 6, 7, 8, as 5 but also striate spirally; 9, 10 nodular costate, costæ showing a slight tendency to become oblique, mainly confined to the lower moiety of the whorls, strongly striate below, and with two noticeably large striæ on the carina, faintly striate above; body whorl with rather coarse spiral lines alternating in size from the carinal region to the end of the beak, supercarinal region faintly striate, costæ obscure; labrum striate within."

This species was described from the Lower Claiborne horizon of Texas. It is found at Smithville Bastrop Co. in moderate numbers.

The varietal name *sylværupis* is proposed for a larger and in some respects very different form from Woods bluff, Ala. Some of the differences have already been pointed out, and others may be given as follows: costæ in the typical form more obtuse especially on the upper part of the spire; supercarinal region more strongly marked in the smaller whorls and the subsutural band prominent in all except the embryonic whorls.

The varietal form is much larger, with a large body whorl (our figure is of an exceptionally narrow or slender form) and the supercarinal zone on the smaller spiral whorls is smooth and often without a subsutural band.

Locality.—ALA.: Woods bluff.

Type of variety and specimen figured.—Lea memorial collection, Acad. Nat. Sci., Phila.

***Pleurotoma servatoidea*,**

Pl. 2, figs. 3, 4.

Syn. *P. servatoidea* Ald., Bull. Am. Pal., vol. 1, p. 59, pl. 5, fig. 5, 1895.

Aldrich's original description.—*Op. cit.*

I feel very confident that in the end this name will be withdrawn in favor of *Pl. huppertzi* Har.; for the latter is subject to considerable variation as shown on pl. 4, Proc. Acad. Nat. Sci., 1895. This is the form referred to on page 58 of the Proceedings, where *huppertzi* was described, in the following terms. "A very closely allied form occurs at Woods bluff, Ala. The main difference consists in the different location of the retral sinus. In the Alabama specimens it is located on the humeral angle while in the Texan it is about one-third way from the angle to the suture."

Aldrich's type from Gregg's landing is a little different from the common Woods bluff specimens but is certainly identical with the same.

When well preserved, the young show a slight carination as indicated by fig. 4. Two or three rather conspicuous and distant spiral lines are located on this carinal zone.

Localities.—ALA.: Woods bluff; Gregg's landing.

Type.—Aldrich's collection.

Pleurotoma moorei,

Pl. 2, fig. 5.

Syn. *Turris moorei* Gabb, Jr. Acad. Nat. Sci. Phila., vol. 4, p. 378, pl. 67, fig. 11. (Not 9.)

Pleurotoma tuomeyi Ald., Geol. Surv. Ala., Bull. 1, p. 31, pl. 3, fig. 11, 1886.

Pleurotoma tuomeyi Heilp., Proc. Acad. Nat. Sci. Phila., 1890, p. 394.

Surcula moorei Heilp., Proc. Acad. Nat. Sci. Phila., 1890, p. 394.

Pl. (*Surcula*) *moorei* Har., Proc. Acad. Nat. Sci. Phila., 1895, p. 57, pl. 4, figs. 6, 6 a, 6 b.

Gabb's original description.—"Shell elongated fusiform, whorls nine or ten, strongly carinate; mouth narrow, long, half the length of the shell, inner lip curved with a very delicate coat of enamel, so thin as to be visible only on a very well preserved specimen, outer lip thin, showing internally the marks of the larger ribs; surface marked by about twenty-five revolving lines, smaller on the shoulder of the whorl (except one large one at the upper edge, below the suture) than elsewhere; in the largest specimens, two or three of the principal ribs are compound; the rest are simple, near the apex; on the upper two of the principal revolving lines are small tubercles which disappear in the succeeding whorls

"Dimensions.—Length, 1.1 in., length of mouth, .55 in., width of body whorl 3 in."

"The fine specimen figured, is in my collection from Caldwell Co., Texas. It is nearly twice as large as any other specimen I have seen of the same species."

A discussion of the slight differences between this and the Texas Lower Claiborne species will be given in our Bulletin on that horizon.

Lignitic localities.—ALA.: Woods bluff.

Type specimen.—Probably lost. Duplicates in Phila. Acad. etc.

Specimen figured.—From Woods bluff.; Paleont. Musuem, Cornell University.

Pleurotoma langdoni,

Pl. 2, fig. 6.

Syn. *Pl. acuminata* ? Heilprin, Proc. Acad. Nat. Sci. Phila., 1880, p. 374, pl. 20, fig. 10.

Pl. langdoni Ald., Bull. Am. Pal., vol. 1, p. 60, pl. 4, fig. 5.

Pl. sp. ? Har., Bull. Am. Pal., vol. 1, p. 192, pl. 17, fig. 14.

Aldrich's description.—(See vol. 1, p. 60.)

We have already seen how in the Midway stage (vol. 1, p. 192) the forerunner of this species differs from the Lignitic or typical form by its less elevated spire, fewer and more prominent costæ, greater basal deflection of columella, etc., and we might add that the subsutural band, of but slight elevation in either form, is traversed by a spiral line in the Midway form while it is rendered crenulate in the Lignitic by the greater strength of the lines of growth as they approach the suture.

A small specimen in my own collection from Bell's landing, has more nearly the ribbing of the Lignitic form though the subsutural elevation is simple like the Midway specimen.

The Hatchetigbee specimens are remarkable for the great comparative size of the body whorl, short spire, fine and oblique costation, coarse spiral and lines of growth, and coarse beading of the subsutural elevated band. In these too it is especially noticeable that it is the lower margin of the subsutural band that is most strongly beaded.

The origin of this species and that of *P. nasuta* is clearly in the Midway *P. persa*; for among the numerous Gregg's landing specimens there are *P. nasuta* extremely close to *P. persa* and at Bell's there are specimens of *nasuta* on the high road to *langdoni*.

Lignitic localities.—ALA.: Bell's landing; Woods bluff, Hatchetigbee bluff.

Type.—Aldrich's collection, from Hatchetigbee.

Specimen figured.—Woods bluff.

Pleurotoma roscoeii, n. sp.,

Pl. 2, fig. 7.

Specific characterization.—Whorls 8 to 10, smooth, the upper whorls very small, while the body whorl and one or two above are comparatively large, giving the sides of the spire a concave appearance; two spiral lines just beneath the suture on the last

three whorls; sinus slightly above the middle; body whorl tumid, spirally striate below; labial collosity prominent.

In external markings this species resembles *P. tombigbeensis*, but in the latter the retral sinus is located higher up on each whorl and is more sharply curved.

Locality.---ALA.: Gregg's landing.

Type.---Paleontological Museum, Cornell University.

***Pleurotoma exiloides*,**

Pl. 2, fig. 8.

Syn. *P. exiloides* Ald., Bull. 1, Geol. Surv. Ala., 1886, p. 30, pl. 3, fig. 9.

Aldrich's original description.---"Shell slender; spire high; whorls ten, rounded, slightly shouldered below the suture; a rather strong impressed line just below, the fainter ones still lower.

"The first four or five whorls of the apex smooth, the others transversely striate, striations very closely set on the body whorl. Slit nearly semicircular; outer lip gently curved; columella bent; canal short, curved to the right.

Locality.---Lower bed, Woods Bluff, Ala.

"This species is close to *P. perexilis*, * * but differs in the breadth of the body whorl, and the slight shouldering of the same. The slit is larger and revolving lines much fainter."

Type and specimen figured.---Aldrich's collection.

***Pleurotoma capax*,**

Pl. 2, fig. 9.

Syn. *P. capax* Whitf., Amer. Jr. Conch., vol. 1, 1865, p. 261, pl. 27, fig. 3.

P. capax Ald., Geol. Surv. Ala., Bull 1, p. 55, 1886.

Whitfield's original description.---"Shell small, broadly fusiform; volutions five, strongly concave on the upper side, and ventricose below; ornamented on the periphery of the upper volutions with a line of nodes, which gradually decrease in size, and finally become obsolete on the body whorl; columella strong, slightly twisted in the lower part; aperture wide, and with the canal, forming more than one-half the entire length of the shell; surface marked by very fine, tortuous, revolving lines, very faint on the concave part of the volutions, crossed by fine lines of growth, having a slight curve in the upper part.

"*Dimensions*.—Length a little less than 1 inch, transverse diameter .45 inch.

"*Locality*.—Six miles above Claiborne, Ala."

Localities.—ALA.: Gregg's landing, Tuscahoma and according to Aldrich, at Bell's landing also.

Type and specimen figured.—Gregg's landing, Paleont. Mus. Cornell University.

Pleurotoma (—?) siphus,

Pl. 2 fig. 10.

Syn. *F. siphus* Ald., Bull. Am. Pal., vol. 1, p. 64, pl. 4, fig. 2.

Fusus (?) *siphus* Cossmann Rev. Bibl. Annee, 1895, p. 35.

Aldrich's original description.—*Op. cit.*

Cossmann says of this species that it is a form "à laquelle je ne vois pas d'analogue et qui mériterait peut-être de former un nouveau sous-genre."

The curvature of the lines of growth backward just below the suture, it seems to us, is sufficiently distinct to indicate a relationship with the Pleurotomids, though the subgenus to which it should be referred is doubtful.

Locality.—ALA.: Gregg's landing.

Type.—Aldrich's collection.

Specimen figured.—Paleont. Mus., Cornell University.

Pleurotoma terebralis, var.

Pl. 2, fig. 11.

Syn. *Cochlespira bella* Con., Am. Jr. Conch., vol. 1, p. 210, pl. 21, fig. 6, 1865.

Pl. (Cochlespira) cristata Heilp, Proc. Ac. Nat. Sci., Phila, 1880, p. 365.

Pleurotoma volgeri Meyer, Proc. Ac. Nat. Sci. Phila., 1884, p. 107.

P. cristata Ald., Geol. Surv. Ala., Bull. 1, p. 52, 1886.

P. terebralis Ald., *idem*, p. 55.

Lamarck first described and named this species in 1804, (Ann. Mus. vol. 3, p. 266). In his Animaux sans Vertèbres, vol. 7, p. 101, 1822, he described the species as follows:

"*Pl. testa fusiformi, subventricosa; striis transversis eleganter granulatis; anfractibus exquisite carinatis; carinis dentatis rotiformibus.*

"*Pleurotoma terebralis* Ann: *ibid.* No. 20."

"Habite—Fossile de Parnes. Cabinet de M. Defrance. Longueur, près de 14 millimètres."

P. terebalis from its typical locality differs from our specimens by having a somewhat longer canal in proportion to the height of the spire, has finer striations and crenulations, and is not so bi-carinate on the body whorl. F. E. Edwards however found (Paleont. Soc. vol. XXI, p. 233, pl. XXVII, figs. 10 a—k.) that the lower Eocene of England contained many varieties of this species and to them he gave six varietal names. Deshayes says in his An. Sans. Vert., vol. 3, p. 359, 1864: "Cette belle espèce est beaucoup plus variable que nous ne nous l'étions imaginé lorsque nous l'avons décrite dans notre premier ouvrage; quelques variétés existent dans le calcaire grossier, mais les plus nombreuses et les plus singulières se montrent dans les sables inférieurs."

In both Old and New world representatives of this species the specimens from lower Lignitic horizons (Sables inférieurs) are less finely crenulate than their middle or upper Eocene posterity.

Lignitic localities.—ALA.: Gregg's landing, Woods bluff, 3 miles S. W. of Thomasville.

Specimen figured.—Paleont. Mus., Cornell University.

***Pleurotoma tombigbeensis*,**

Pl. 2, fig. 12, a.

Syn. *P. tombigbeensis* Ald., Bull. 1, Geol. Surv. Ala., 1886, p. 30, pl. 3, fig. 10.

Aldrich's original description.—"Shell large, rather thick and solid, fusiform; whorls eleven; suture impressed; the spire regularly acuminate, the upper whorls flattened; lower ones constricted below the suture.

"Body whorl constricted about the center, tapering regularly toward the beak; a large number of fine sinuous revolving lines upon this lower part.

"Aperture less than half the length of the shell; slit small, situated at the lower part of the sutural constriction, its outer edge rising up and rounded; canal moderate, open, bent a little to the right; columella with a reflected callus near the beak.

Locality.—Lower bed, Woods bluff, Ala.

“On younger specimens the constriction below the suture is obsolete, being replaced by a few faint revolving lines. Resembles *P. longiforma*, nobis, but in some respects differs. It is much more fusiform, heavier, the body whorl much more tapering below. The aperture gradually diminishes anteriorly, while in the first mentioned species, and in *P. gabbi* Con., the canal is long and slender.”

Localities.—ALA.: Woods bluff; near the mouth of Bashi creek; Bell's landing.

Type and specimen figured.—Aldrich's collection, from Woods bluff.

***Pleurotoma silicata*,**

Pl. 2, fig. 13.

Syn. *P. silicata* Ald., Bull. Am. Pal., vol. 1, p. 60, pl. 4, fig. 3, 1895.

Aldrich's original description.—*Loc. cit.*

Locality.—ALA.: Gregg's landing.

Type.—Aldrich's collection.

Specimen figured.—Paleont. Mus., Cornell University.

***Surcula nasuta*.**

Pl. 2, figs. 14, 15.

Syn. *P. nasuta* Whitf., Amer., Jr. Conch. vol. 1, p. 262, 1865.

P. nasuta Ald., Geol. Surv. Ala. Bull. 1, p. 55, 1886.

P. nasuta Har., Proc. Ac. Nat. Sci. Phila., 1896, p. 478, pl. 22, fig. 7.

Whitfield's original description.—“Shell fusiform, much elongated and slender; spire consisting of five or six whorls; volutions concave above, subangular in the middle, and rounded below, marked on the middle by a row of longitudinally elongate nodes; entire surface marked by fine, somewhat alternating, revolving lines, less distinct on the channel formed by the notch of the aperture; suture distinct, bounded below by an elevated band; aperture narrow, elongate, and, together with the long, straight canal, forming more than one-half the length of the shell.

Locality.—Six miles above Claiborne, Ala., west side of the river.”

This species is extremely variable in ornamentation, ranging in this respect nearly all the way from *persa* to *langdoni*. It is

very abundant at Gregg's landing, but occurs at other places as indicated below. This is decidedly a lower Lignitic species.

No one would at first sight regard fig. 14 as belonging to this species. In fact one of my assistants had labelled it *P. persa*, and it certainly does have the appearance of that species. But by closer examination it is seen to have a rather deeper or sharper retral sinus, somewhat inclined to become carinate sub-centrally and costate. Others associated with it have much stronger costations. At Yellow bluff somewhat more *nasuta*-like forms occur; at Tuscahoma still more typical *nasuta* are found while at Gregg's landing the type form occurs in abundance.

***Pleurotoma cainei*, n. sp.**

Pl. 2, fig. 16.

Specific characterization.—Size and general form as indicated by the figure; embryonic whorls in perfect specimens about four or five in number, smooth; five post-embryonic whorls of the spire strongly marked by deeply incised spiral lines, the first one below the suture slightly stronger than the others causing a slight constriction at this place; costæ scarcely observable when the spire is pointed towards the light, but when turned sidewise the low, rounded, curved ribs are very evident; from the suture they pass upwards and to the right till a point just above the middle of the whorl is reached and there bend rather sharply to the left, becoming less strong and then pass upwards to the suture, forming a slight enlargement at that place; body whorl with humeral region marked by ribs as described above, dying out below, and by strong spiral lines.

Closely allied to *P. variata* Edw. and *P. koninckii* Nyst, from the London clay. Costation somewhat as in *heninghausii* Lea.

Localities.—ALA.: Woods bluff; 3 miles S. W. of Thomasville.

Type.—Paleontological Museum, Cornell Univ.

***Pleurotoma georgei*, n. sp.,**

Pl. 2, fig. 17.

Specific characterization.—Size and general form as indicated by the figure; whorls 7 or 8; 1, 2 and sometimes 3 smooth; 3 or 4 obliquely ribbed longitudinally; 4 to 7 or 5 to 8 with ten or

eleven nearly vertical (more oblique on the body whorl) costæ, extending from suture to suture, somewhat carinated centrally, crossed on the shoulder by about six fine spiral striæ and three or four strong raised lines below the middle of the whorl; columella very obliquely striate below.

I have tried in vain to refer this to the young of some larger form. The broad retral sinus on the humeral zone distinguishes this species at once from the preceding.

Locality.—ALA.: Woods bluff.

Type.—Paleontological Museum, Cornell Univ.

***Pleurotoma carlottæ*, n. sp.,**

Pl. 3, fig. 1.

Specific characterization.—Size and general form as indicated by the figure; whorls about 10; 1, 2 and 3 smooth, increasing rapidly in size, 4 and 5 longitudinally costate, 6-9 marked by (a) a rather prominent subsutural raised broad line, (b) numerous costæ very prominent on the middle of the whorls but faint above and below, crossed on the humeral region by a faint spiral line and on the carinal by two stronger spirals, and by a fourth spiral half way from carina to suture below; 10, or body whorl, marked as 6-9 but having the subsutural band sometimes furrowed by a medial spiral line and more or less crenulated by many rather deep transverse lines; raised spirals alternating and decreasing in strength towards the base.

Localities.—ALA.: Woods bluff; 3 mi. S. W. of Thomasville.

Type and specimen figured.—Woods bluff: Paleontological Museum, Cornell Univ.

***Pleurotomella sigma*, n. sp.,**

Pl. 3, fig. 2.

Specific characterization.—Size and general form as shown by the figure; whorls about seven; (apex?); marked by about fourteen rather prominent costæ, vertical and of about the breadth of the interspaces above, but becoming more oblique and of about one-half the breadth of the interspaces below, especially on the body whorl; a slightly elevated band just below the suture; surface covered with evenly set, alternating coarse and fine lines.

This is intermediate in many respects to *P. whitfieldi* Ald., and *P. bellistriata* Clark.

Locality.—ALA.: Woods bluff.

Type and specimen figured.—Paleont. Mus. Cornell Univ.

Pleurotoma (Mangilia) infans,

Pl 3, fig. 3.

Syn. ? *Scobinella læviplicata* Gabb, Jr. Acad. Nat. Sci. Phila., vol. 4, p. 380, pl. 67, fig. 20, 1860.

Pleurotoma infans Meyer, Geol. Surv. Ala., Bull. 1, p. 75, pl. 2, fig. 9, 1886.

Scobinella infans Cossin., Ann. de Geol. et Pal., p. 43, 1893.

Pl. infans Har., Proc. Ac. Nat. Sci. Phila., 1895, p. 62, pl. 5, fig. 10.

Glyphostoma harrisi Ald., Bull. Am. Pal., vol. 1, p. 61, pl. 2, fig. 11, 1895.

Meyer's original description.—"Small; aperture and canal about one-third of the entire length; the pointed apex is formed by two and a half small, smooth, embryonic whorls; three rather large transversely ribbed, embryonic whorls complete the nucleus; the largest specimen has three adult whorls,—they are strongly carinated in the middle; the upper part has only one revolving line near the suture, the lower part three elevated spirals; the upper part indicates the position of the large, regularly rounded sinus; the lines of the growth are almost rib-like.

Localities.—Red bluff, Miss., Newton, Miss., Claiborne? Ala., Vicksburg, Miss. (var)."

Meyer's specimens are evidently all young or imperfect, for in the well grown examples from Texas there are four adult whorls. Moreover, they show two large tooth-like projections on the inside of the labrum and not unfrequently two small plaits on the columella. On the smooth sinus zone there is sometimes a fine spiral line; occasionally there are two.

The Lignitic specimens show one, rarely two large spiral lines or carinæ on the medial and upper whorls. None so far as noticed show signs of labral or labial dentition.

Lignitic locality.—ALA.: Woods bluff.

Its range is now extended from the Lignitic to Oligocene inclusive.

Type.—Red bluff, Miss.; Aldrich collection.

Specimen figured.—Woods bluff; Paleont. Mus. Cornell Univ.

***Pleurotoma veatchi*, n. sp.,**

Pl. 3, fig. 4.

Specific characterization.—Shell long fusiform; when complete and unworn, with five smooth embryonic whorls, then one more or less vertically ribbed, and finally about three spiral whorls; the latter with spiral alternate lines and curving humeral costal folds, dying out towards the suture and below the shoulder, almost obsolete on the body whorl. Mouth fully as long as the spire; columella long, straight.

Locality.—ALA.: Woods bluff.

Type and specimen figured.—Lea Memorial collection, Acad. Nat. Sci. Phila.

CANCELLARIA.

***Cancellaria sylværupis*,**

Pl. 3, fig. 5.

Syn. *C. sylværupis* Har., Proc. Ac. Nat. Sci. Phila., 1896, p. 476, pl. 20, fig. 11,

Harris' original description.—"General form and size as indicated by the figure; whorls about 6; 3 embryonic smooth; others with about 8 strong spiral lines between the suture above and the suture below; incremental lines especially prominent between the strong raised spirals; labrum sharp at edge but abruptly thickening and varicose a slight distance within; columella concave, two plaits on its subcentral portion and one marginal one below.

This species reminds one of *C. quadrata* of England and *C. ulmula* from Texas."

Locality.—ALA.: Woods bluff.

Type and specimen figured.—Lea Memorial collection, Acad. Nat. Sci. Phila.

Cancellaria quercoliis, var. greggi, nov. var.,

Pl. 3, fig. 6.

Syn. *Volutilithes quercollis* Har., Bull. Am. Pal., vol. 1, p. 199, pl. 18, fig. 4.

Varietal characterization.—Costæ on body whorl about 20 instead of 15; 4 or 5 revolving lines or bands present on each spiral whorl with interspaces marked by three thread-like raised lines, the middle one the largest.

So extremely different is this spiral ornamentation from that of the specimen I formerly referred to a form of *Volutilithes*, a Midway type, that it is perhaps hazardous to refer this to the same species. But the peculiar, oblique costation, nonconformable to the lines of the growth, the smooth apical whorls, the fact that the lower part of the columella and body whorls of *quercollis* were gone and hence the generic position was not certain, all tend to suggest a probable relationship between these very different looking forms.

Localities.—ALA.: Gregg's and Bell's landings.

Specimen figured. Paleont. Mus., Cornell Univ.

Cancellaria tortiplica,

Pl. 3, fig. 7.

Syn. *C. tortiplica* Con., Am. Jr. Conch., vol. 1, p. 145, 1865; p. 211, pl. 20, fig. 8. (Not pl. 21 as stated by Conrad).

C. evulsa Heilp., Proc. Ac. Nat. Sci. Phila., 1880, p. 365.

C. tortiplica Har., Proc. Ac. Nat. Sci. Phila., 1896, p. 475, pl. 20, fig. 10.

Conrad's original description.—"Subfusiform, with longitudinal narrow ribs and a few thick varices; volutions six, those of the spire convex; regular, prominent revolving lines, six in number, on the penultimate volution, eighteen or nineteen on the body whorl, fine, and crowded near the suture and base; labrum striate within; columella with three sinuous plaits, the upper one large and thick.

"Length $\frac{3}{8}$ inch."

"*Locality.*—Texas.

In my Phila. Acad. paper (see above), I gave Conrad's incorrect reference to his plate and figure, i.e.: I wrote fig. 8, pl. 21, when I should have written fig. 8, pl. 20. Conrad's pl. 21,

fig. 8 represents *Cancellaria ellapsa*, a Cretaceous, Texan, species with no columellar plications. It is doubtless the same as *Trichotropis cancellaria*.

C. tortiplica shows at Woods bluff great variations, both as regards form and general outline. As a rule the body whorl is larger in proportion to the whole shell than the figure would lead one to suppose. This is particularly true of the Texan specimens. The two anterior plicæ are apt to be more or less united at base, or in other words are both superimposed on a common fold.

Localities.—Alabama: Woods bluff ; Choctaw corner.

Type.—From Texas, according to Conrad; Museum Acad. Nat. Sci., Phila.

***Cancellaria lanceolata*,**

Pl. 3, fig. 8.

Syn. *C. lanceolata* Ald., Nautilus, vol. 11, p. 27, (fig.), 1897.

"Shell elongated, whorls seven, first three nuclear and smooth, the others cancellated and having three strong revolving lines, the middle one much the larger, the costæ numerous and fine. Whorls are shouldered, suture deeply marked; body whorl with seven or eight revolving raised lines. Aperture oblong, outer lip serrated by the raised lines, nearly smooth within. Columella lip without callus, bearing two or more folds, part of the raised lines passing into the aperture to form them; canal short, oblique, slightly twisted; no umbilicus. Length $7\frac{1}{2}$ mm., diam. $3\frac{3}{4}$ mm.

"*Locality*.—ALA.: Choctaw corner, Woods bluff horizon.

"This little shell has some resemblance to *C. pulcherrima* H. C. Lea, but Mr. C. W. Johnson, of the Wagner Free Institute of Science, has compared the two and finds the above distinct. The specimens are not fully matured. One of the two specimens has been presented to the 'Lea Collection,' in the Academy of Natural Sciences of Philadelphia."

This is evidently a young specimen of the same species shown by pl. 3, fig. 8. It might now be characterized as follows:—Whorls about 10: 1–3 smooth; remaining whorls with two strong carinal raised bands or ridges and sometimes a third just above the suture; sharply defined raised axial lines extend from the suture backward obliquely and outward to the upper carina, pass over

the same and extend more nearly vertically to the lower carina, thence obliquely to the left to the suture below; on the body whorl the direction again changes to obliquely to the right; umbilicus rather rudimentary; columellar plaits as follows: anteriorly a rather indistinct, nearly vertical slight fold on the columella, above and to the left of which is a slight groove and above this a plait, very obliquely set, and well separated from the next above or posterior by a deep groove, this groove widening and extending into the umbilicus; large posterior plait transversely set within but curving down into the umbilicus without; strong spiral ridges often form plait-like projections posterior to the above mentioned plaits. This species is closely allied to *Cancellaria maglorii* as figured by Deshayes, Desc. An. Sans Vert., vol. 2, pl. LXXII, figs. 18, 19, 1864.

Locality.—ALA.: Woods bluff; Choctaw corner.

Type.—Aldrich's collection.

Specimen figured.—Pl. 3, fig. 8. Paleont. Mus., Cornell Univ.

***Cancellaria marieana*,**

Pl. 3, fig. 9.

C. marieana Ald., Bull. Am. Pal., vol. 2, p. 179, pl. 2, fig. 6, 1897.

Aldrich's original description.—*Op. cit.*

We have several good specimens of this species from Woods bluff, one of which shows a slight carination as indicated by the figure. Others, however, are without any trace of such a feature. The comparatively straight columnella and especially the columellar plication and the umbilicus serve to distinguish them at once from the young of *C. tortiplica*.

Localities.—ALA.: Woods bluff: (Choctaw corner, Aldrich.)

Type and specimen figured.—Aldrich's collection; from Choctaw corner.

***Cancellaria graciloides*,**

Pl. 3, fig. 11.

Syn. *C. graciloides*, Ald., The Nautilus, vol. 11, p. 98, 1898.

Aldrich's original description.—Shell broadly fusiform, spire elevated, whorls 6-7, rounded, slightly shouldered, cancellated, first three smooth, on the others the revolving lines are numerous,

strongly defined; lines of growth smaller and much finer than the revolving lines, suture deeply impressed, outer lip expanded, strongly nodular within, columella with three folds, aperture pointed and canaliculate at base.

"Height 12 mm., width 7 mm.

"*Locality*.—Gregg's landing; Alabama river, Alabama."

***Cancellaria graciloides* var. *bella*, nov. var.,**

Pl. 3, fig. 10.

"Characterized by strong, rounded varices, as many as three on the body whorl. Shell is smaller than the type.

"Height 10 mm., width 6 mm.

"*Locality*.—Gregg's landing, Alabama river, Alabama."

Many specimens from this locality show that the variety could more properly have been called the species, and that the specimen called the type of the species could have been referred to a variety of the same. In other words, var. *bella* is the common, abundant, well defined form, while *graciloides* is very rare.

Mr. Aldrich has very kindly furnished the figures herewith given and has lent me the type specimens for study. On our largest specimens the lines of growth at their intersection with the revolving bands or heavy lines form slight nodes or tubercles.

Localities.—Alabama: Gregg's landing; Bell's landing.

Types and specimens figured.—Aldrich's collection.

***Olivella mediavia*,**

Pl. 3, fig. 12.

Syn. *V. bombilis*, var, Ald., Geol. Surv. Ala., Bull. 1, p. 53, 1886.

O. gracilis Ald., Geol. Surv. Ala., Bull. 1, p. 56, 1886.

O. mediavia Har., Bull. Am. Pal., vol. 1., p. 194, pl. 17, fig. 19.

Harris' original description.—(*Loc. cit.*)

Lignitic specimens are sometimes nearly twice the size of the Midway prototypes. They do not as a rule show the geniculation in the growth lines on the lower portion of the body whorl so plainly as do the Midway specimens. A labial callosity near the posterior portion of the aperture is often quite evident. The extent to which the spire is callosed over varies considerably in different specimens; generally there is an exceedingly narrow band of shell showing lines of growth just below the suture.

Lignitic localities.—ALA.: Bell's landing; Woods bluff.

Specimen figured.—Woods bluff; Paleontological Museum, Cornell Univ.

Ancilla (Olivula) staminea,

Pl. 3, fig. 13.

Syn. *A. staminea* Con., Foss. Sh. Tert. Form., p. 25. pl. 10, fig. 5.

Anaulax staminea Con., Proc. Ac. Nat. Sci., Phila., 1857, p. 166.

A. staminea Ald., Geol. Surv. Ala., Bull. 1, p. 51, 1886.

Conrad's original description.—"Cylindrical, with strong longitudinal lines and minute revolving wrinkled striæ; a slight elevation crowns the whorls, defined by a separating line; spire very short, apex rather obtuse; suture distinct; inferior portion of the columella with an elevated profoundly striated callus, above which are three or four lines revolving to the base; aperture gradually contracted above and effuse at the base.

Locality.—ALA., Claiborne, Middle Tertiary.

"Of the species described by Lamarck, this shell approaches nearest *A. canalifera*. These two species do not correspond entirely with the genus *Ancillaria*, as the aperture is much longer, the shells are striated, and the suture is somewhat channeled. They might constitute a separate genus by the name of OLIVULA, and would connect *Ancillaria* with *Oliva*."

The Lignitic form of this species differs considerably from the typical Claibornian; it is smaller, heavier, smoother, and with much higher spire. Specimens from the Lower Claiborne beds at Smithville, Texas, have the high spire of the Lignitic specimens, but in other respects approach closely, except in size, the typical forms.

Locality.—ALA.: Woods bluff.

Specimen figured.—Paleontological Mus., Cornell Univ.

Buccinanops ellipticum,

Pl. 3, figs. 14, 15.

Syn. *Pseudoliva elliptica* Whitf., Am. Jr. Conch., vol. 1, p. 260.

Pseudoliva elliptica Ald., Jr. Cinn. Soc. Nat. Hist., July, 1897, p. 80.

Whitfield's original description.—"Shell small, broadly elliptical; spire produced above, pointed; volutions, four or five, rounded on the sides, the largest slightly inflated; suture close, bounded by a

narrow band below; columella a little twisted, and flattened in the lower part; aperture wide, a little more than half the length of the shell, pointed above and deeply notched at the base; a very faint revolving groove at the top of the anterior third of the body volution, marking the place of the very small tooth-like projection on the outer lip; surface smooth, except a rather broad band near the base of the last volution formed by the siphonal notch."

"*Dimensions*.—Length, $\frac{3}{4}$ inch, transverse diameter $\frac{3}{8}$ inch."

"*Locality*.—Vicksburg, Miss."

Aldrich (loc. cit.) says: "The locality given by Whitfield is no doubt incorrect. The shell is described from a single specimen. An examination of the contents of the interior of the type showed a light colored sand exactly similar to that in my specimens collected from Bell's landing, Alabama, on the Alabama river. The type is a half grown form.

Personally I have not been able to see Whitfield's Alabama types, but I have no doubt Aldrich is right in the foregoing statement. If so, then in all probability it is the form I have figured, especially common at Yellow bluff, that should be referred to this species. This may be, and probably is the Lignitic representative of *Buccinanops alittle*, but for the present the two will be kept separate.

Localities.—ALA.: Bell's landing? and Yellow bluff.

Type.—Hall's collection.

Specimen figured.—Paleont. Mus., Cornell Univ.

***Pseudoliva vetusta*.**

Pl. 3, fig. 16.

Syn. See Bull. Am. Pal., vol. 1, p. 213.

The Lignitic specimens are apt to have an enormous callosity of the inner lip, especially posteriorly. The latter volutions are kept out away from those just preceeding by this callosity. In the same way, *Volutilithes petrosus* is distorted, forming an apparently distinct species called *V. tuomeyi*. The great variation of this species at different stages of growth and under dissimilar circumstances has caused many names to be given as specific, when if given at all they should have been employed to designate the varieties only. See our bulletin on the Lower Claiborne stage.

Lignitic localities.—ALA.: Bell's landing; Yellow bluff; near mouth of Bashi creek; 4 mi. above Hamilton bluff; Hatchetigbee; Nanafalia; Tusahoma.

Specimen figured.—Lea Memorial collection, Acad. Nat. Sci., Phila.

***Pseudoliva tuberculifera*,**

Pl. 3, fig. 17.

Syn. *P. tuberculifera* Con., Jour. Acad. Nat. Sci., Phila., vol. 4, p. 294, pl. 47, fig. 27, 1860.

Conrad's original description.—"Short-fusiform, with well defined revolving lines; angle of body whorl with compressed tubercles; whorls of spire longitudinally ribbed, the penultimate whorl distinctly ribbed; above the angle of the body whorl the area is slightly concave and tumid or salient above; umbilicus none. Length 1 inch; diameter $\frac{5}{8}$ inch.

Cossmann's *P. tuberculifera* Ann. de Géol. et de Paléont., 1893, p. 2, fig. 13, is without doubt the young of *P. vetusta*.

Localities.—ALA.: Bell's landing. MD.: South river, north bank, at mouth of Beaver creek.

Type.—Acad. Nat. Sci., Phila. (Not from Claiborne as the label reads.)

Specimen figured.—Paleontological Museum, Cornell Univ.

***Pseudoliva scalina*,**

Pl. 3, fig. 18.

Syn. *P. scalina* Heilp., Proc. Ac. Nat. Sci., Phila., 1880, p. 371, pl. 20, fig. 12.

P. scalina Ald., Geol. Surv. Ala., Bull. 1, p. 20, pl. 6, fig. 10.

Heilprin's original description.—"Shell bucciniform, of about seven volutions; the whorls roughly plicated; the folds on the body whorl appearing as shoulder nodules; dentiferous sulcus well pronounced, followed by about five impressed revolving lines, which slightly crenulate the margin of the outer lip; revolving lines on the body whorl above the sulcus almost obsolete; aperture slightly exceeding the spire in length; columella callous; suture deeply channeled. Length, $1\frac{1}{2}$ inch. Woods bluff, Clark Co., Ala."

Aldrich has very kindly lent us the large fine specimen shown about $\frac{1}{2}$ natural size by fig. 18.

Localities.—Alabama: Bell's landing; Nanafalia; Woods bluff.

Type.—From Wood's bluff; Cabinet Ala. Univ., Tuscaloosa, Ala.

Specimen figured.—Bell's landing: Aldrich's collection.

Volutilithes petrosus,

* Pl. 4, fig. 1.

Syn. *Voluta petrosa* Con., Foss. Sh. Tert. Form., p. 29, Aug., 1833; p. 41, pl. 16, fig. 2, 1835.

" *vanuxemi* Lea, Cont. to Geol., p. 173, pl. 6, fig. 182, Dec. 1833.

" *parva* Lea, *ibid*, p. 173, pl. 6, fig. 181.

Athleta tuomeyi Con., Proc. Ac. Nat. Sci. Phila., 1853, p. 449.

Voluta tuomeyi Tuomey, 2d Bien. Rept. Geol. Ala., p. 270.

" *petrosa* Tuomey, 2d Bien. Rept. Geol. Ala., p. 272.

Volutilithes (Athleta) tuomeyi Con., Jr. Acad. Nat. Sci. Phila., vol. 4, pl. 47, fig. 35, 1860.

" (*Athleta*) *tuomeyi* Con., Am. Jr. Conch., vol. 1, p. 24, 1865.

" *symmetricus* Con., Wailes' Agr. Miss., 1854, pl. 15, fig. 6; Proc. Ac. Nat. Sci. Phila., 1865, p. 260.

" *dumosus* Con., Wailes' Agr. Miss., 1854, pl. 16, fig. 1.

" *indenta* Con., Am. Jr. Conch. vol. 1, p. 144, p. 211, pl. 21, fig. 10.

" *impressa* Con., Am. Pr. Conch., vol. 1, p. 144, p. 211, pl. 20, fig. 3.

" (*Athleta*) *tuomeyi*, Heilp., Proc. Acad. Nat. Sci. Phila., 1880, p. 365.

Voluta Athleta tuomeyi Ald., Geol. Surv. Ala., Bull. 1, pp. 58, 55, 52, 50.

Volutilithes petrosus Dall, Tr. Wag. Fr. Inst. Sci., vol. 3, p. 75, 1890.

? " *precursor* Dall, Tr. Wag. Fr. Inst. Sci., vol. 3, p. 84, pl. 6, fig. 1, 1890.

" *Athleta tuomeyi* Clark, U. S. G. S. Bull. 141, p. 65, pl. 10, fig. 1, 6.

? *Volutilithes lisbonensis* Ald., Bull. Am. Pal., vol. 2, p. 180, pl. 3, fig. 1, a, 1897.

Conrad's original description.—"Shell subglabrous; body whorl marked with from eight to ten longitudinal folds terminating on the shoulder in compressed subacute tubercles, which are also distinct on the spire; transversely striated at base; two folds on the columella. Length, $1\frac{1}{2}$ inches.

"*Locality.* Claiborne, Alabama."

Several hundred specimens of this species ranging from Lignitic to Jackson horizons inclusive, in the collection at the Smithsonian Institution were studied by the writer on several occasions in preparing certain reports on Eocene fossils. Conrad's *Athleta tuomeyi* represents only an exaggerated case of sutural and labial callosity. Dall agreed to this view of the matter and so arranged his synonyms, (Tr. Wag. Fr. Inst. Sci., vol. 3). *Pseudoliva vetusta* is similarly diseased by Lignitic conditions. *Venericardia planicosta* is also excessively thickened under similar conditions.

Of the recently named *V. precursor* and *V. lisbonensis* it may be said that they are of doubtful validity. Dall was mistaken in supposing that his *V. precursor* was associated with *V. rugatus*, a Midway species. It is in reality associated with *V. petrosus* in the Lower Claiborne beds of Texas and is separated from the latter with the greatest difficulty. Aldrich's *V. lisbonensis* is one of the many connecting forms. Next year we shall have occasion to give figures of the other intermediate varieties.

Lignitic localities.—Texas: Sabinetown. Alabama: Nanafalia; Tuscahoma; mouth of Bashí creek; Woods bluff; Hatchetigbee bluff; Yellow bluff; Gregg's landing; Bell's landing.

Choctaw creek, Bethel, 4 mi. S. Mt. Sterling, Hatchetigbee, Hendrick's marl bed, Butler. Aldrich.

Type.—Acad. Nat. Sci. Phila. Heilpin has improperly added "Claiborne, Alabama," on Conrad's original label.

Specimen figured.—From Woods bluff. Paleontological Mus., Cornell University.

***Voluta claræ*, n. sp.,**

Pl. 4, fig. 2.

Specific characterization. Size and form as indicated by the figure; whorls marked by 8 or 9 costæ, more or less continuous from one whorl to the other; body whorl marked by costæ having a tendency to become somewhat shouldered and spine bearing; just below the suture are traces of fine spiral lines; they reappear near the base of the shell; otherwise surface smooth, shining; columellar plications eight in number, ultimate anterior small, penultimate large and strong, third smaller, fourth-eighth almost linear.

Localities.—Alabama : Hatchetigbee bluff ; Woods bluff.

Type and specimen figured.—Hatchetigbee ; Paleontological Museum, Cornell University.

Voluta, sp.,

Pl. 4, fig. 3.

This fragmentary specimen was found at Yellow bluff. It is the only *Voluta* we have presenting the plication features as shown in the figure. The costation is continued to a slight extent even on the body whorl. It is just possible however that this is but an aberrant form of *V. newcombiana*, though it is more probably an ancestral type of *Lapparia patilis*.

Voluta newcombiana,

Pl. 4, figs. 4, 4 a.

Syn. *V. newcombiana* Whitf., Am. Jour. Conch., vol. 1, p. 263, pl. 27, fig. 12.

" " Ald., Geol. Surv. Ala., Bull. 1, pp. 55, 58, 1886.

" " Ald., Jr. Cinn. Soc. Nat. Hist., 1887, p. 81.

" " Dall, Tr. Wag. Fr. Inst. Sci., vol. 3, p. 69, 1890.

Whitfield's original description.—"Shell strong and robust ; volutions six or more, moderately convex in the younger stages of growth, becoming more ventricose, and finally angular in the upper part of the body whorl ; suture distinct ; aperture about four times as long as wide, angular above, and deeply notched at the base, forming more than one-half the length of the shell ; columellar folds four, very strong, the upper one transverse, the lower ones more oblique ; outer lip thick and smooth ; surface marked only by distinct lines of growth.

"*Dimensions*.—Length $3\frac{1}{2}$ inches, diameter $1\frac{5}{8}$ inches.

"*Locality*.—Six miles above Claiborne, Alabama."

By this Whitfield doubtless meant Bell's landing. Aldrich states in 1887 that it is found only at this locality, while in 1886 he gives Nanafalia as well. It is not rare at Yellow bluff.

Type.—Hall's collection.

Specimen figured.—Paleont. Mus., Cornell University.

Scaphella heilprini,

Pl. 4, fig. 5.

- Syn. *Turbinella* (*Caricella*) *bandoni* Heilp. (mistake for *bandoni*).
 Proc. Ac. Nat. Sci. Phila., 1880, p. 373, pl. 20, fig. 15.
Turbinella (*Caricella*) *bandoni* Ald., Geol. Surv. Ala., Bull. 1, p. 51.
Scaphella (*Caricella*) *heilprini* Trans. Wag. Fr. Inst. Sci., vol. 3, p.
 88, 1890.

This species has never been described, but was referred to by Heilprin as follows: "The large species of *Caricella* from Knight's branch agrees so closely with the figures of *Voluta baudoni* Desh. (Animaux sans Vertèbres, Bassin de Paris, 11, pl. 102, figs. 13 and 14), from the Paris basin, that I do not feel justified in considering it a distinct species. The American form appears to have been somewhat more elevated, but this is probably no more than a varietal circumstance.

"Length, 4 inches. Knight's branch, Clark Co., Alabama.

Dall says very properly "that the *Voluta baudoni* of Deshayes, to which this species was referred in 1880 by Prof. Heilprin, is not likely to be a *Caricella* or nearly related to the present species."

Localities.—Alabama: Woods bluff. Knight's branch, according to Heilprin. Four miles south of Mt. Sterling.—Aldrich.

Type.—Probably Ac. Nat. Sci. Phila.

Specimen figured.—Woods bluff; Paleont. Mus., Cornell University.

Scaphella demissa, var.,

Pl. 4, figs. 6, 7.

- Syn. *Caricella demissa* Con., Proc. Ac. Nat. Sci. Phila. 1847, p. 289;
 Journal &c., p. 120, pl. 12, fig. 5.

Conrad's original description.—"Subfusiform; whorls six, convex, one or two whorls near the apex distinctly striated longitudinally, and with minute revolving lines; upper part of the whorls slightly concave; apex papillated, first and second volutions smooth, entire; beak striated; aperture about two-thirds the length of the shell; columella 4-plaited. Length, $1\frac{2}{3}$ inches."

Described from the Oligocene of Vicksburg, Miss.

The specimens in question differ considerably from typical *demissa* in the proportional lengths of the spire and mouth. Moreover it is only the second whorl from the apex which is costated, the others are smooth save for the very fine microscopic spiral lines.

Each whorl is tightly appressed to the preceding, hence there is no trace of a shoulder. In *S. heilprini* there is a very slight trace of a shoulder at the suture. The latter species has no costation on its apical whorls.

Gabb described another variety of this type of *Caricella* under the name of *Cymbiola texana*, from the Lower Claiborne of Wheelock, Texas.

Locality.—Alabama : Gregg's landing.

Specimens figured.—Paleont. Mus., Cornell Univ.

***Caricella podagrina*,**

Pl. 4, fig. 8.

Syn. *Turbinella pyruloides* Ald., Geol. Surv. Ala., Bull. 1, p. 56, 1886.

C. podagrina Dall, Trans. Wag. Free Inst. Sci., vol. 3, p. 86, 1890.

" " Dall, *ibid*, p. 228, pl. 20, fig. 9, 1893.

" " Harris, Proc. Ac. Nat. Sci. Phila., 1896, p. 479, pl. 23, fig. 2.

Dall's original description.—" *C. podagrina* differs from *C. pyruloides*, and especially from *C. subangulata* (under which name I have received it from Mr. Aldrich), by its much more sunken spire, the tops of the whorls being flat or excavated; by the last whorl with a marked but not sharp angulation at the shoulder, and wider anteriorly; and by the sutural edge of the last whorl, which is elevated and rounded, dropping suddenly to the suture instead of being smoothly appressed against it. Wailes' figure does not show the suture of *subangulata* accurately. *C. podagrina* is also larger, much more solid and heavy, with a less polished surface, and belongs to a much earlier geological horizon.

"The nucleus is large and blunt, followed by about four whorls, which are spirally striated and show well-marked incremental lines. Between the angle and the sutural sinus, which last is emphasized, the lip is somewhat concave. In front of the angle it is nearly straight. There are four strong

columellar plaits. There are no traces of color on the outside of the shell, but the middle layer of the shell, when exposed by erosion, is of a very dark color, when well preserved. In full-grown specimens there is a rather thick callus on the body whorl. The species reaches a size of 90 x 70 mm. The plaits are rather thicker and closer together than in *C. subangulata* of the same size."

Locality.—Alabama: Bell's landing.

Lapparia dumosa, Con. var.,

Aldrich cites this species (*Mitra dumosa*, var.) from Hatchetigbee bluff, (Geol. Surv. Ala., Bull. 1, p. 50), but we did not find the species there.

Dall says *Lapparia* extends from "early to later Eocene," (Trans. Wag. Inst. vol. 3, p. 79,) but I am inclined to think that if any specimens are labeled in the U. S. Nat. Museum as coming from Midway or lower Lignitic localities it is owing to confusion of labels in the collection, by L. C. Johnson.

Conomitra tracyi, n. sp.,

Pl. 4, fig. 9.

Specific characterization.—Size and form as indicated by the figure; whorls about 7; 1 and 2 smooth; 3 longitudinally costate; remaining whorls marked by rather small, sharp costæ extending from the suture below to the humeral angle, a depressed subsutural slope ornamented just below the suture with a reappearance of the costæ seen below; body whorl with more or less sharply defined spirals; aperture showing four transverse columellar plaits, the most anterior often very faint, the medial two strong; labrum crenate within.

If one had the spire alone of this species it could scarcely be told from the smaller whorls of *Volutilithes petrosus* and so it doubtless has been regarded, for it is quite common at Woods bluff and would doubtless have been described before now had it not had so deceitful surface ornamentation. The young of *Volutilithes* however have much longer anterior canals, the columella is arcuate and there are but two well marked plicæ on it and they are oblique, the anterior the stronger.

Localities.—Alabama: Woods bluff; 3 miles southwest of Thomasville, near Choctaw corner.

Type and specimen figured.—Near Choctaw corner; Paleont. Mus., Cornell University.

Mitra pergracilis,

Pl. 4, fig. 10.

Syn. *Fasciolaria pergracilis* Ald., Geol. Surv. Ala., Bull. 1, p. 22, pl. 5, fig. 18, 1886.

Aldrich's original description.—"Shell narrowly fusiform; spire very slender; suture impressed; whorls thirteen, nucleus composed of three smooth ones, the following seven are longitudinally ribbed, balance nearly smooth; two equi-distant revolving grooves, (the one nearest the suture the largest) border it throughout.

"Canal long, spirally striated; outer lip smooth; columella bearing posteriorly three faint oblique plaits far within the aperture.

"*Locality*.—Gregg's landing, Alabama." Also, according to Aldrich p. 56, at Bell's, Lower Peach Tree and Tuscahoma.

The plaits are very small indeed and are generally but two in number. The plaits are not located sufficiently anteriorly to indicate affinities with the genus *Fasciolaria*. Nor are the plaits like those of typical *Mitra*, yet the general ornamentation and shell structure indicate a close relationship with the *Mitræ*. Cossmann has strangely enough confounded this with *Exilia pergracilis* with which it has no relation.

Type.—Aldrich's collection.

Specimen figured.—Gregg's landing, Alabama; Paleont. Museum, Cornell University.

Mitra hatchetigbeensis,

Pl. 3, fig. 11.

Syn. *M. hatchetigbeensis* Ald., Bull. 1, Geol. Surv. Ala., p. 28, pl. 6, fig. 3, 1886.

Aldrich's original description.—"Narrow fusiform; whorls about ten; suture impressed; nucleus smooth; upper whorls longitudinally ribbed, carinate at their center and tuberculated;

the body whorl slightly concave above, with transverse tubercles; whole surface covered with fine revolving lines.

"Aperture narrow, nearly half the length of the shell; outer lip smooth; columella straight, with three nearly equal, oblique plaits.

"*Locality*.—Hatchetigbee bluff, Alabama."

Our figure shows a few additional specific characters.

Localities.—Alabama: Hatchetigbee bluff; 4 miles above Hamilton bluff, Alabama river.

Type.—Aldrich's collection.

Specimen figured.—Hatchetigbee bluff; Paleont. Museum, Cornell University.

Fusus ? whitfieldi, Ald.

Aldrich cites this species from Gregg's as well as Matthews' landing. We have not found it at the former locality, though it is by no means rare at the latter, (See *Pleurotomella whitfieldi*, Bull. Am. Pal. vol. 1, p. 190, pl. 17, fig. 8.)

Fusus interstriatus,

Pl. 5. figs. 1, 2.

Syn. *F. interstriatus* Proc. Ac. Nat. Sci. Phila., 1880. p. 372, pl. 20, fig. 11.

F. tombigbeensis Ald., Geol. Surv. Ala., Bull. 1, p. 22, pl. 5, fig. 7, 1886.

Heilprin's original description.—"Shell fusiform, slender, composed of about ten convex volutions, the first three of which are smooth; whorls ornamented with both longitudinal plications and revolving lines, the last of which (about eight in the upper whorls), alternate with finer intermediate striæ; the longitudinal plications distinct on the earlier whorls, but becoming much less so on the body whorl, and the one preceding; aperture about the length of the spire; the canal somewhat tortuous; outer lip thin, dentate within.

"Length, 2 inches. Knight's branch; Cave branch, Clark Co., Alabama."

The surface ornamentation of this species varies considerably.

There is however no way of distinguishing the form represented by fig. 1 and that by fig. 2, they pass from one to the other with imperceptible gradations. The specimen Aldrich called *F. tombigbeensis* is of the rugose type and has a tendency to present crenules or nodules at the intersection of the spiral and longitudinal lines. This feature however, in a large quantity of material, is found to be not of specific value. Aldrich remarks: "The type specimen has unfortunately lost its canal, but a younger specimen supplied the description. Younger specimens have the whorls more carinated than in the figured type." Unfortunately the "younger specimen" referred to is a *Pleurotoma* (pl. 2, fig. 4). The young of this *Fusus* are not particularly carinate.

Localities.—Alabama: Woods bluff; Choctaw corner; Ozark. 4 miles south of Mt. Sterling:—Aldrich. Knight's branch, Cave branch.—Heilprin.

Type—Supposed to be in Acad. Nat. Sci. Phila.

Specimens figured.—Woods bluff; Paleont. Museum, Cornell University.

Fusus bellanus

Pl. 5, fig. 3.

Syn. *F. bellanus* Har., Proc. Acad. Nat. Sci. Phila., 1897, p. 479, pl. 23, fig. 3.

Harris' original description.—"Size and general form of the shell as indicated by the figure; whorls 8 or 9; embryonic 3 smooth; others marked by from 8 to 10 sharp, flattened peripheral spines, at whose base, or immediately at the suture, a subordinate series of spines occurs on the larger whorls; canal nearly closed, long, straight; labial callus thin. At first sight this seemed like a large, well-formed *F. mohri*, but on comparing details it was found to be very distinct."

Locality.—Alabama; Bell's landing.

Type and specimen figured.—Lea Memorial collection, Acad. Nat. Sci. Phila.

Fusus subtenuis,

Pl. 5, fig. 4.

Syn. *F. subtenuis* Heilp., Proc. Ac. Nat. Sci. Phila., 1880, p. 371, pl. 20, fig. 4.

F. subtenuis Ald., Geol. Surv. Ala., Bull. 1, pp. 52, 55, 1886.

Heilprin's original description.—"Shell fusiform, of about seven sub-angular volutions: whorls ornamented by somewhat obscure longitudinal folds, about twelve on the body whorl, which are cut by several prominent revolving ridges commencing at the shoulder angulation; shoulder of the whorls more or less smooth, with an obscure median revolving line, and a prominent subsutural one; aperture about the length of the spire, or slightly exceeding it, the canal gently curved, moderately contracted, and somewhat expanding at the extremity; outer lip thin, and showing internally the external ornamentation; base with numerous revolving lines, which alternate in coarseness.

"Length, $1\frac{1}{4}$ inches. Knight's branch, Clark Co., Alabama."

Our figure represents the typical Woods bluff form. Specimens from Bell's landing and occasionally at Woods bluff show a less marked carination and the space between the upper carinal line and the suture is traversed by two or more spiral lines, there are more spirals on the back of the anterior canal, the columella is also nearly rectilinear. This species doubtless merges into *F. mortoni* Lea.

Localities.—Alabama: Woods bluff, Gregg's landing, Bell's landing. Lower Peach Tree, Butler, Hatchetigbee bluff, Choctaw corner.—Aldrich. Knight's branch, Cave branch.—Heilprin.

Type.—Probably in Acad. Nat. Sci. Phila.

Specimen figured.—Woods bluff; Paleont. Museum, Cornell University.

Fusus ottonis,

Pl. 5, fig. 5.

Syn. *Fusus meyeri* (See Bull. Am. Pal., vol. 1, p. 201, pl. 18, fig. 12, 1896).

Fusus ottonis Ald., Bull. Am. Pal., vol. 2, 1897.

The type specimen of this species is herewith refigured. As observed in vol. 1, p. 201, this is considerably different from the Midway form.

Lignitic localities.—Alabama: Woods bluff, and according to Aldrich, also at Lower Peach Tree.

Type.—Woods bluff, Aldrich collection.

In the Lea Memorial collection there is a *Fusus* with finer costation and less angulation at the middle of each whorl. It is probably a new species, though the striation suggests a relationship with this species. It is from Bell's.

***Fusus rugatus*,**

Pl. 5. fig. 6.

Syn. *F. rugatus*, Ald., Bull. 1, Geol. Surv. Ala., p. 22, pl. 5, fig. 9.

F. rugatus, Har., Proc. Acad. Nat. Sci. Phila., 1896, p. 478, pl. 22, fig. 8.

Aldrich's original description.—"Shell fusiform, spire high, suture linear; whorls carinated, concave and smooth above, rounded below, the periphery of each whorl with numerous tubercles, some of them reaching to a second revolving raised line below; the whorl next above the body whorl showing two tuberculated lines below the carina; body whorl showing four rows of spinous lines, contracted rather abruptly below them; canal covered with distant spiral rows of sharp spines; aperture small, angulated posteriorly, terminating in a long, narrow canal.

"*Locality.*—Gregg's landing, Alabama.

"The type specimen is broken, but other specimens likewise broken show a long, narrow canal, spirally striated to the end."

Type.—Aldrich's collection.

Specimen figured.—Gregg's landing; Lea Memorial collection.

***Fusus (Buccinofusus) harrisi*,**

Pl. 5. fig. 7.

Syn. *Fusus harrisi* Ald., Bull. Am. Pal., vol. 1, p. 64, pl. 5, figs. 2, 8.

Buccinofusus harrisi Cossm., Revue Bibliographique, 1895, p. 35.
(From Journal de Conchyliologie, 1895.)

Aldrich's original description.—(*Op. cit.*)—In most specimens there is a broad, but well defined retral curve in the lines of growth as well as in the ribs on the humeral slope. In this respect the ribs remind one slightly of *Buccinum undulatum*,

but in the latter the lines of growth do not follow the curvature of the ribs. Neither our nor Aldrich's figures show the feature clearly.

Localities.—Alabama: Gregg's landing; Yellow bluff.

Types.—Aldrich's collection.

Specimen figured.—Gregg's landing; Paleont. Museum, Cornell University.

***Exilia pergracilis*, Con.**

See Bull. Am. Pal., vol. 1, p. 204.

Aldrich finds this species at Nanafalia, (see Bull. 1, Geol. Surv. Ala., p. 58), a Lignitic locality. This is one of the specimens obtained by Conrad through Dr. Showalter and labelled simply "Alabama," though the lot of fossils were said to have come from a comparatively northern locality; doubtless this came from Matthews' landing. Heilprin, strangely enough, had "Claiborne, Ala.," put on the label.

De Gregorio and Cossmann suggest the marked similarity or even identity of this with Aldrich's *Fasciolaria pergracilis*. With good specimens of both before me I must confess I can see no similarity between these forms. *Exilia* has three embryonic smooth whorls followed by the spiral whorls which are ribbed longitudinally with a slight Pleurotomoid flexure not far below the suture. Over these ribs pass fine, incised, revolving lines. The ribs on the upper spirals of *F. pergracilis* are rectilinear and perpendicular. The lower whorls possess broad, incised spirals, across which vertical lines pass as in *Actæon*. It also has faint columellar plaits.

***Clavilithes kennedyanus*,**

P. 5, fig. 8.

Syn. *Clavilithes kennedyanus* Har., Proc. Acad. Nat. Sci. Phila., 1895, p. 73, pl. 7, fig. 8.

Harri's original description.—"General form as figured; whorls 10 & 12; 1 and 2 probably smooth; 3-10 with nodular ribs most prominent on the lower portions of the whorls, crossed

by raised spiral lines and by even lines of growth; body whorl in the type specimen very poorly preserved, but showing few signs of costæ; columella ponderous.

"*Locality*.—Smithville, Bastrop county, Texas.

"*Geological horizon*.—Lower Claiborne Eocene.

"*Type*—Texas State Museum."

This species, unlike *C. humerosus*, runs up to a fairly sharp apex. Its penultimate and body whorls closely resemble *C. vicksburgensis*.

Lignitic localities.—Alabama: Woods bluff; Nanafalia.

Specimens figured.—Paleontological Museum, Cornell University.

***Latirus tortilis*, var. *nanafalius*, nov. var.,**

Pl. 5, fig. 9.

This differs from typical *tortilis* of the Midway, (see Bull. Am. Pal. vol. 1, p. 203), by having a shorter spire, more pointed spines and only one very faint raised line on the columella representing apparently the upper faint one in *tortilis*. The peculiar microscopic markings on the exterior, caused by the fine lines of growth becoming somewhat imbricate as they pass over spirals, is alike in both forms and leads one instinctively to group the two together, though they differ considerably in form.

Locality.—Alabama: Nanafalia.

Type of variety.—Paleontological Museum, Cornell Univ.

***Siphonalia*, sp., No. 1,**

Pl. 5, fig. 10.

***Siphonalia*, sp., No. 2,**

Pl. 6, fig. 1.

The fact that our *Claiborne* Eocene fossils were first to be described makes our stratigraphic treatment of the Eocene fauna, from Midway upwards, occasionally very difficult. Many short, semi-fusiform shells were described by Lea and Conrad from Claiborne whose synonymies have been and perhaps ever will be in doubt. Here are doubtless ancestral types of one or more of those forms; but we must postpone giving final names to them until their Claiborne and Lower Claiborne allies have been most carefully studied.

No. 1 is from Yellow bluff, where it is quite common.

No. 2 is from Hatchetigbee bluff.

Both are in the Paleontological Museum of Cornell University.

Turbinella (Glyptostyla ?) baculus,

Pl. 6, fig. 2.

Syn. *Turbinella baculus* Ald., Bull. 1, Geol. Surv. Ala., 1886, p. 27, pl. 6, figs. 2, a.

Aldrich's original description.—"Shell robust, broadly fusiform ; whorls five,—two forming a nucleus, next two cancellated. Body whorl large and globose ; revolving striæ alternately coarse and fine, well marked, while the longitudinal ones on it become faint.

"Aperture over half the length of the shell ; outer lip smooth ; columella with two nearly equal erect plaits ; callus thin, spreading ; canal short, open and recurved. No umbilicus.

"*Locality.*—Bell's landing, Alabama.

"A specimen in the State Collection is over twice as large as the type, but imperfect."

The general appearance of this shell with its twisted canal is precisely *Strepsidura* ; it has no sharp basal fold like that genus but has, instead, higher up, two well formed transverse folds like *Glyptostyla* Dall.

Localities.—Alabama : Gregg's and Bell's landings.

Type.—Aldrich's collection.

Specimen figured.—From Gregg's ; Paleont. Museum, Cornell University.

Pyropsis perula,

Pl. 6, fig. 3, a.

Syn. *P. perula* Ald., Bull. 1, Geol. Surv. Ala., 1886, p. 25, pl. 3, fig. 4.

" " Har., Bull. Am. Pal., vol. 4, p. 204, pl. 19, fig. 2.

" " Har., Proc. Acad. Nat. Sci. Phila., 1896, pl. 21, fig. 1.

Though the large rough stems of this species are by no means rare, its occurrence in the form indicated by the figure is quite phenominal.

Lignitic localities.—Alabama : Woods bluff ; Aldrich records it also from Gregg's and Tuscahoma. Maryland : Casts from Ft. Washington and localities in Virginia indicate the probable presence of this species in the Lignitic of the Maryland-Virginia basin.

Specimen figured.—Woods bluff ; Lea Memorial Collection, Acad. Nat. Sci. Phila.

Chrysodomus engonata,

Pl. 6, fig. 4.

Syn. *Fusus* (*Hemifusus* ?) *engonatus* Heilp., Proc. Ac. Nat. Sci, Phila., 1880, p. 372, pl. 20, fig. 8,
Fusus engonatus Ald., Geol. Surv. Ala., Bull. 1, p. 52, 1886.

Heilprin's original description.—"Shell turreted, of about ten volutions, the first three whorls smooth and convex, the remainder strongly carinated, and traversed by numerous fine revolving lines, which on the median portion of the body whorl alternate with intermediate finer striæ ; body whorl impressed immediately below the carination (shoulder angulation) ; lines of growth sinuous, and approximating the characteristic lines of the Pleurotomidæ ; aperture considerably exceeding the spire in length ; columella slightly arcuate, and presenting a rudimentary fold at about its central portion.

"Length, $1\frac{1}{3}$ inches. Woods bluff, Clarke Co., Ala.

"This species resembles the *Fusus bifasciatus* of Deshayes, (Annimaux sans Vertèbres, Bassin de Paris, 11, pl. 84, figs. 15, 16,) from the Paris basin, but may be readily distinguished from that species by its more slender form."

This species is found in the lower Claiborne beds of Texas ; in the Lignitic of Alabama at Woods bluff, on the Tombigbee ; near Butler ; mouth of Bashi creek ; and Nanafalia.

Three of the embryonic whorls of this species are smooth and rotund and increase rapidly in size ; the fourth is rotund and non-carinate, but is marked by a net-work of lines, faint at first but stronger below ; the fifth whorl is also marked by longitudinal and spiral lines and is carinate centrally.

Type.—Presumably in the Philadelphia Academy, though not seen by the writer.

Specimen figured.—Paleontological Museum, Cornell University.

Sipho tuomeyi,

Pl. 6, fig. 5.

Syn. *Bulbifusus tuomeyi* Ald., Bull. 1, Geol. Surv. Ala., 1886, p. 23, pl. 6, figs. 12a.

Aldrich's original description.—"Shell large, bulbiform; whorls seven; spire moderate; body whorl very large and globose, flattened above and slightly concave, contracted below and finely striated; aperture oblong-ovate; outer lip smooth within; columella strongly excavated, canal wide and curved.

"*Locality*.—Bell's landing, Alabama.

"This species may only be a strongly marked variety of *B. inauratus* Con., * * * but the younger specimen * * * from Gregg's landing differs from Conrad's species in having finely revolving lines over its whole surface, whorls convex, closely appressed at the suture, while the other has the whorls concave, the lines obsolete on the central part of the body whorl, is shouldered at the suture, which is in a groove, and generally has the first four whorls of the spire with a row of revolving nodes above the suture."

This is a very thin delicate form, found at Gregg's landing. Aldrich's type specimen bearing the original label with statement that it is the type and has been figured, says plainly "Gregg's landing."

This thin shell with very rounded or bulging spiral whorls may possibly be related to *Mazzalina* but it seems to us closer still to the living *Sipho ventricosus* off the coast of Newfoundland.

Specimen figured.—Paleontological Museum, Cornell University.

Chrysodomus striata,

Pl. 6, fig. 6.

Syn. *Cominella striata* Ald., Bull. 1, Geol. Surv. Ala., 1886, p. 26, pl. 5, fig. 4.

Aldrich's original description.—"Shell ovate, fusiform; whorls five to six, with fine transverse lines, shouldered. Suture in a depressed groove. Lines of growth sinuous, giving the shell

rather a rough exterior. Body whorl contracted rapidly from the center toward the base. Striæ coarser on the basal portion; spire about one third the length of the shell: apex blunt; aperture oblong-ovate, smooth within. Columella broadly reflected; canal produced canaliculate at base.

“*Locality*.—Alabama: Hatchetigbee bluff.

“Differs from the previous species, [*C. hatchetigbeensis*,] by being striate, its more produced spire and fusiform shape.

“The outer tip [lip?] is broken away, but the lines of growth indicate a semicircular slit, as in the former species.”

When viewed from the apex, this shell shows quite a prominent broad channel just below the suture. Below there are indications of short, slight ribs or faint spines. The lines of growth in passing from the latitude of faint spines bend to the left as they pass upwards and over the broad channel to the suture. This reminds one of *Levifusus* and we may well wonder if the canaliculate fulgurs may not have had a similar form for their prototype.

Type and specimen figured.—Aldrich's collection.

Siphonalia subscalarina,

Pl. 6, fig. 7.

Syn. *Fusus* (*Strepsidura*) *subscalarinus* Heilp., Proc. Ac. Nat. Sci. Phila., 1880, p. 372, pl. 20, fig. 7.

Heilprin's original description.—“Shell somewhat bucciniform; whorls about eight, sub-angular, the first three or four smooth, the remainder ornamented with both longitudinal costæ and revolving striæ, the latter showing a tendency to alternate in size; the costæ are arcuate, not in a regular continuous series, those on the body whorl extending considerably below the middle of the whorl; aperture about the length of the spire, the canal somewhat reflected; columella covered with a callous deposit, considerably twisted; outer lip dentate within.

“Length, 1 inch. Knight's branch; Cave branch, Clarke Co., Alabama.

“This species greatly resembles the *Fusus scalarinus* of Deshayes (Coquilles Fossiles, 11, p. 574, pl. LXXIII, figs. 27 and 28), but may be distinguished by the lesser prominence of its

costæ, and by the presence of well defined striæ over the entire surface of the whorls. In this last respect, as well as in the subangulated form of the whorls, it also differs from the *Fusus scalariformis* Nyst (Coquilles et Polypiers Fossiles, p. 504, pl. XL, figs. 5a, 6), from Lethen, Belgium.

Localities.—Alabama : Woods bluff ; Gregg's landing ; Bell's ; Lower Peach Tree ; Cave branch : Knight's branch ; Choctaw corner ; Hatchetigbee.

Type.—Probably somewhere in the Acad. Nat. Sci., Philadelphia.

Levifusus trabeatus,

Pl. 6, fig. 8.

Syn. See Bull. Am. Pal., vol. 1, p. 209.

Also Proc. Acad. Nat. Sci., Phila., 1896, p. 479, pl. 22, fig. 11.

Conrad's original description.—See vol. 1, p. 209.

As remarked in Proc. Acad. &c., this figure represents one of the largest and most compact varieties of the species. "The labral liræ are unusually well marked ; the carinal nodules are very large but imperfectly defined." The specimen belongs to the Lea Memorial Collection and was obtained by C. W. Johnson, at Bell's landing.

Lignitic localities.—Alabama : Hatchetigbee ; Woods bluff ; Yellow bluff ; Choctaw ; Bell's ; Tuscahoma ; Nanafalia. Butler.—Aldrich. Texas : Sabinetown.

Type.—Acad. Nat. Sci. Phila.

Levifusus supraplanus, nov. sp.,

Pl. 6, fig. 9.

In a former report, (Bull. Am. Pal., vol 1, p. 207), I considered this form as a variety of *L. suteri*. Specimens in my own collection, in the University's, and in that of the Lea Memorial at the Academy of Natural Sciences fail to show such similarities with *suteri* as to warrant their specific identity with that species.

Specific characterization.—Size and general form as figured ; spiral whorls about eight ; surface smooth and almost shining, with lines of growth somewhat sinuous and irregular ; median carination sharply defined, bearing about ten flattened spines,

over whose summits passes a heavy, raised spiral line; body whorl rendered slightly bicarinate by a strong, raised spiral, proceeding forward from the upper limit of the aperture; below this spiral are others diminishing in strength to the end of the canal.

Differs from *suteri* by lack of a bisected carina, lack of spiral lines on the spire, and the presence of a long, straight, Fusoid canal.

Localities.—Alabama: Gregg's and Bell's landings; Yellow bluff.

Type and specimen figured.—Paleontological Museum, Cornell University.

Levifusus pagoda,

Pl. 6, fig. 10.

Syn. *Pleurotoma pagoda* Heilprin, Proc. U. S. Nat. Museum, vol. 3, p. 149, pl. fig. 1.

Fusus pagodiformis Heilp., Proc. Ac. Nat. Sci. Phila., 1880, p. 375.

" " Ald., Geol. Surv. Ala., Bull. 1, p. 55, 1886.

" " Heilp., Proc. Acad. Nat. Sci., 1890, p. 395.

Levifusus pagoda var. Har. Bull. Am. Pal., vol. 1, p. 207, pl. 19, fig. 8.

Levifusus pagoda Ald., Bull. Am. Pal., vol. 2, p. 170, pl. 4, fig. 3.

For Heilprin's original description, see Bull. Am. Pal. vol. 1, p. 207.

Plate 6, fig. 10, shows a very stout specimen of this species, with carinal spines unusually close to the suture. The great mass of Woods bluff specimens are more fusiform with carinal spines raised some little distance above the suture. Their largest or body whorl is apt to have few and weak spines. At Gregg's landing the specimens are more in harmony with the figure, though the spines on the larger whorls of specimens from that landing are rather more numerous. At Yellow bluff the specimens are still stouter and spines still more numerous. From Oakhill, (See Bull. 1, p. 207), a Midway locality, the species again goes back to its normal size, but is more strongly marked by spiral heavy lines on the body whorl and a tendency to split the carinal spines by an incised spiral line, such as is well developed in *L. suteri*.

Lignitic localities.—Alabama: Woods bluff; Choctaw corner; Bell's landing; Gregg's landing; Tuscahoma.

Type.—U. S. National Museum.

Cyllene bellana,

Pl. 6, fig. 11.

Syn. *C. bellana* Har., Proc. Acad. Nat. Sci. Phila., 1896, p. 479, pl. 23, fig. 4.

Harris' original description.—Size and general form as indicated by the figure; whorls about 8; embryonic 3 small, smooth, others finely costate and with fine revolving lines; costæ strongest on the central portion of the whorls (*i. e.* on the shoulder) vanishing above, reaching the suture below; columella twisted, *Strepsidura*-like below; labrum lirate within; exterior of body whorl with extremely fine revolving lines on its central portion, and with coarser lines above the carina and near the base.

'Locality.—Bell's landing, Alabama.' Also at Gregg's.

Type.—Returned with others to Wagner Institute, but reported by Johnson as missed, when box was unpacked.

Levibuccinum lineatum,

Pl. 6, fig. 12.

Syn. See Bull. Am. Pal. vol. 1, p. 211.

This species attains its best development in the Lignitic, and our figure shows a perfect specimen.

Lignitic locality.—Alabama: Woods bluff.

Type.—In the Philadelphia Academy of Natural Sciences, if not lost.

Levifusus indentus, nov. sp.,

Pl. 7, fig. 1.

Specific characterization.—Size and general form as indicated by the figure; spire consisting of about seven whorls, apex generally destroyed; submedial carina ornamented with about nine rather narrow, well marked though obtusely pointed spines; showing to the suture below but influencing the supra-humeral region but little; spines on larger whorls more or less flattened or pinched longitudinally; spiral lines numerous and fine; longitudinal lines with a slightly *Surcula*-like retral sinus on the

humeral region; body whorl often showing before each narrow, blunt-pointed, vertically flattened spine an indentation, or a slightly depressed channel, most evident at the upper left hand base of each spine and continuing with more or less distinctness to the upper right-hand portion of the next spine to the left; spiral striation coarser below the carina, the lines often making an upward flexure while passing the longitude of each spine.

After reading Dall's account of the many varieties of *Fulgur spiniger* (vol. III, p. 107, Trans. Wag. &c.), that are found in the Oligocene, and noting too that Aldrich cites "*Fusus*" *spiniger* from Tuscaloosa, I cannot help wondering whether the form under discussion might not be specifically identical with *spiniger*. But, so far, none of the varieties of the latter species seem to have the comparatively Fusoid spire of *indentus*, nor are the spines imbricate as described by Dall *op. cit.* p. 110. We are inclined to think *spiniger* a true *Fulgur*, while this species has the Pleurotomoid features of *Levifusus*. That *Fulgur* is derived from *Levifusus* there can be little or no doubt. *L. pagoda* when well developed in the lower Lignitic approaches this form.

Fragments of a large Fulguroid species in the Lea Memorial collection from Yellow Bluff and Bell's landing may belong to a variety of this species. The whorls are more squarely shouldered and the spines less flattened vertically.

Localities.—Alabama: Nanafalia. Georgia: Bluff at Ft. Gaines.

Type.—Paleontological Museum, Cornell University.

***Triumphis hatchetigbeensis*,**

Pl. 7, fig. 3.

Syn. *Cominella hatchetigbeensis* Ald., Bull. 1, Geol. Surv. Ala., 1886, p. 26, pl. 3, figs. 6, a, b.

Eburna hatchetigbeensis de Greg., Mon. Faun. Eoc. Ala., p. 108, 1890.

Aldrich's original description.—"Shell bucciniform, oblong-ovate; whorls shouldered, with a depressed groove at the suture. Spire short, smooth; apex obtuse. Body whorl strongly shouldered, contracted below, with numerous revolving lines on the basal portion, which are obsolete on the middle part; the

centre is flattened, sometimes concave. Aperture oblong-ovate; outer lip sinuous, with a distinct, rounded semicircular slit on the upper third below the shoulder, smooth internally; inner lip smooth, reflected, thickened above and below.

"*Locality*.—Hatchetigbee bluff. In two different horizons there.

"This peculiar form has such a distinct slit in the outer lip * * *, that it may deserve a sub-generic place, though it resembles the living *Cominella maculata* Martyn, from New Zealand. In one specimen the shoulder of the body whorl rises so as to almost hide the succeeding whorl, giving the shell a triangular form.

The generic affinities of this species are not well known. It seems to us that it should be the type of a new subgenus if not of a genus placed near *Triumphis*. *T. distorta* Linné, has very much the general appearance of this species but lacks all traces of the Pleurotomoid labral sinus as well as the broad tooth-like projection near the base of the labrum.

Type.—Aldrich's collection.

***Tritonidea johnsoni*,**

Pl. 7, fig. 4.

Syn. *Pisania* (*Tritonidea*) *johnsoni* Ald., Bull. Am. Pal., vol. 1, p. 65, pl. 5, fig. 9.

For Aldrich's original description, *loc. cit.*

The type, in Aldrich's collection, from Bell's landing is herewith redrawn. We have found no additional specimens of this species.

***Mazzalina* var. *plenus*,**

Pl. 7, fig. 5.

Syn. *Bulbifusus plenus* Ald., Bull. 1, Geol. Surv., Ala., 1886, p. 23, pl. 6, fig. 7.

For *M. inaurata* see our following bulletins on the Eocene of Alabama.

Aldrich's original description.—"Shell broadly fusiform; whorls probably six, surface on upper whorls with a few distinct revolving lines, which on the upper part of the body become faint; body whorl swollen above, rapidly narrowing below, where it is spirally striated with alternate raised lines; whorls

thickened and constricted at suture and suddenly rounded ; suture hidden in the groove thus formed ; surface finely marked with lines of growth ; aperture oblong-ovate, terminating in a rather broad canal, which turned to the left ; outer lip slightly crenate within ; columella smooth, no perceptible callus on posterior part.

"Locality.—Bell's landing, Alabama.

"Resembles somewhat the Jacksonian species of Clavella, but its whorls are few, spire low and canal recurved. The apex is worn but appears to be blunt."

When we consider the enormous amount of variation shown by this shell in the Lower Claiborne, Claiborne, and especially in the Jackson beds of Arkansas, we are obliged to regard this as but a mild divergence from typical *inaurata*.

The type of this variety, herewith figured, is from Aldrich's collection.

***Euthria dubia*,**

Pl. 7, fig. 6.

Syn. *Pisania* ? *dubia* Ald., Bull. 1, Geol. Surv. Ala., 1886, p. 25, pl. 3, fig. 13.

Pisania dubia Coss., Ann. Geol. et Pal., 12e liv., 1893, p. 34.

Aldrich's original description.—"Shell fusiform ; whorls rounded, about eight in number ; spire acute ; surface covered with equidistant revolving lines, which are broadly rounded, the spaces between smooth.

"Lines of growth obsolete ; the embryonic whorls are smooth. Aperture oblong-ovate ; canal moderate ; outer lip thickened and striate within ; inner lip smooth, slightly excavated, thickened and angular at junction with canal.

Locality.—Lower bed, Wood's bluff.

"The absence of a callosity at the posterior end of the aperture makes the generic place doubtful."

This species resembles several of the modern *Euthria*. There seems to be no trace of a posterior tooth on the columella, hence it is not a *Pisania*. Its slightly irregular mode of growth recalls some species of *Neptunea*.

Locality.—Woods bluff.

Specimen figured.—Paleont. Museum, Cornell Univ.

Metula sylværupis, n. sp.,

Pl. 7, fig. 7.

Specific characterization.—Size and general form as shown by the figure ; embryonic three whorls smooth ; the fourth cancellated, the fifth, sixth and seventh cancellated, slightly shouldered, with one or two comparatively large spiral lines on the humeral slope ; growth irregular, interrupted by one or two low varices on each whorl ; body whorl with markings similar to those on the whorls just above, though with finer lines near the base ; labrum sharp-edged, but thickening rapidly behind, varix-like, with close-set, short striations (or elongate crenulations interiorly), noticeably thickened exteriorly ; labial callosity thickened above.

Locality.—Alabama : Woods bluff ; Hatchetigbee.

Type and specimen figured.—Woods bluff ; Paleontological Museum, Cornell University.

Macron philadelphicus, n. sp.,

Pl. 7, fig. 8.

Specific characterization.—Form and size as figured ; whorls probably about eight, though only five showing in the only specimen known ; spiral whorls with about seven broad low undulations or ribs extending from the suture below, three-fourths the way to the suture above where a subsutural contraction cuts them off ; body whorl smooth except at base where alternating spirals occur ; shoulder sharp, channeled with a flange appressed to the whorl above ; labium callous ; umbilicus incipient.

Locality.—Alabama : Yellow Bluff.

Type.—Lea Memorial Collection, Academy of Natural Sciences, Philadelphia.

Nassa cancellata, Lea.

Aldrich cites this species from Hatchetigbee, Woods bluff, Butler, Bell's and Gregg's landings, Alabama. Our collections afford no representations from Lignitic localities. See *N. exilis*.

Nassa (——) *exilis*,

Pl. 7, fig. 9,

Syn. *Simpulum* (*Epidromus*) *exilis* Con., Jour. Acad. Nat. Sci. Phila., vol. 4, p. 293, pl. 47, fig. 31, 1860.

Triton exilis Ald., Geol. Surv. Ala., Bull. 1, p. 56, 1886. ("*Nassa cancellata*"?).

Triton exilis de Greg., Mon. Faun. Eoc. Ala., p. 98, pl. 7, fig. 44, 1890.

Cominella ? *interanda* Cossm., Ann. Geol. and Pal., 1893, p. 34.

Conrad's original description.—"Elongated; whorls seven, rounded; ribs longitudinal, numerous; revolving lines fine and raised, eleven or twelve on the penultimate whorl: body whorl striated to the base; spire much longer than aperture; columella plain and obtusely carinated at base; labrum striated within; peristome sinuous. Length $\frac{1}{2}$ inch."

Some forms of this species, especially when the lower end of the columella has been broken off or eroded—which frequently happens—resemble closely *N. cancellata* Lea. Yet when examined under a hand glass these accidental features are readily detected; and I yet have to find any specimens of *cancellata* in Lignitic beds. De Gregorio correctly remarks: "la figure de Conrad laisse à désirer." Cossmann was perplexed at a specimen of this species sent him from Gregg's by Meyer under the name of *Buccinum sagemum*, and referred it to one of De Gregorio's many species, *i. e.* to *interanda*. He was again perplexed as to its generic position, referring it to *Cominella* with a query.

That this is not far from *Nassa cancellata* is evident from Hatchetigbee specimens which are shorter, coarser ribbed, and with columnar features not so sharply defined as in typical *exilis*.

Localities.—Alabama: Gregg's landing; four miles above Hamilton bluff on Alabama river; Hatchetigbee bluff.

Type.—Doubtless in Acad. Nat. Sci. Phila., though I fail to find reference to it in my notes.

Specimen figured.—From Gregg's landing; now in the Paleontological Museum, Cornell University.

Bulliopsis choctavensis,

Pl. 7, fig. 10.

Syn. *Melanopsis choctavensis*, Ald., Geol. Surv. Ala., Bull. 1, p. 35, pl. 3, fig. 8, 1886.

Nassa calli Ald., Geol. Surv. Ala., Bull. 1, p. 27, pl. 5, fig. 5.

Pasithea de Greg., Faun. Eoc. Ala., p. 164, pl. 16, fig. 36, 1890.

Nasseburna calli de Greg., Faun. Eoc. Ala., p. 108, pl. 7, fig. 62, a, b, 1890.

Aldrich's original description.—"Shell oblong-ovate; whorls six, shouldered; spire obtuse, the upper part generally plicate; suture impressed distinct. Body whorl constricted below the shoulder, smooth on the main part; fine revolving lines below and often a few on the shoulder, sometimes continuing to the apex just below the suture. Aperture oblong-ovate, canaliculate at base; outer lip smooth, slightly thickened within; columella with a thickened and reflected callus."

I fail to see wherein *choctavensis* and *calli* differ much except in size.

I do not believe this belongs to the fresh water Melanian genus *Melanopsis* of the Old World. Nor do I believe Fischer is right, (see Manual Conch. p. 703), in referring Conrad's *Bulliopsis* to *Melanopsis*. This species has some resemblance to *Bulliopsis quadrata* Con. of the Miocene as Aldrich has stated; and I am not sure but *Bulliopsis* should be put under *Buccinanops*, i. e. *Bullia*.

Localities.—Alabama: Hatchetigbee; Woods bluff; and according to Aldrich also at Butler, Choctaw corner. "*Calli*" is from Lisbon.

Type.—Aldrich's collection.

Specimen figured.—Hatchetigbee bluff; Paleontological Museum, Cornell University.

Astyris subfraxa, n. sp.,

Pl. 7, fig. 11.

Specific characterization.—General form and size as indicated by the figure; embryonic whorls smooth at first, increasing rapidly in size, four or five in number, then two vertically ribbed, embryonic whorls; below, three smooth spirals: body whorl strongly striated below, usually irregularly fractured;

columella with traces of two plaits or rather mere pustules; labrum smooth within.

Differs from *bastropensis* Har. by having two instead of one costate embryonic whorl, is smaller and more robust.

Locality.—Alabama: Woods bluff.

Type.—Paleontological Museum, Cornell University.

***Æsopus erectus*,**

Pl. 7, fig. 12.

Syn. *Sipho erecta* Ald., Bull. Am. Pal., vol. 1, p. 65, pl. 5, fig. 7.

Probably not *S. ? erecta* Har., Proc. Ac. Nat. Sci., Phila., 1896, p. 476, pl. 21, fig. 3.

For Aldrich's original description see vol. 1, p. 65.

We have recently added a large number of this species to the University collection from Woods bluff and it proves to be quite different from what we had supposed from an examination of the figure. Its relationship to the Columbelloidæ is certain, but to which genus it will finally be referred is now uncertain. The exterior markings recall many species of *Turricula* and *Mitra*, but its aperture is decidedly of the *Astyris* type. There are however no labral crenulations. On the columella of the type specimen there are traces of two faint oblique folds. The present figure represents an adult shell from Woods bluff, and now in the University collection.

This species recalls *Æsopus filiosus* of Australian waters.

***Terebrifusus amœnus*,**

Pl. 7, fig. 13.

Syn. *Buccinum amœnum* Con., Foss. Sh. Tert. Form., p. 45, Nov., 1833.
Terebra gracilis Lea., Cont. to Geol., p. 166, pl. 5, fig. 171, Dec., 1833.

Terebra multiplicata H. C. Lea, Am. Jour. Sci., vol. 40, p. 101, pl. 1, fig. 19, 1840.

Terebrifusus amœnus Con., Am. Jr. Conch., vol. 1, p. 28, 1865.

Terebrifusus amœnus Coss., Ann. Geol. et Pal., 1893, p. 37, pl. 2, fig. 14.

Terebrifusus amœnus Ald., Bull. Am. Pal., vol. 1, p. 62, pl. 2, fig. 15, 1895.

Conrad's original description.—"Subulate, with about six slightly convex volutions; with distant obtuse longitudinal ribs, and acute prominent equidistant spiral striæ; aperture con-

tracted, less than half the length of the shell; base very slightly reflected." From Claiborne.

Lignitic locality.—Alabama; Woods bluff.

Type.—Academy of Natural Sciences, Philadelphia.

Specimen figured.—Paleontological Museum, Cornell University.

Mitrella mississippiensis.

Pl. 7, fig. 14.

Syn. *Columbella mississippiensis*, Ald. and M'r. Jr., Cinn. Soc. Nat. Hist., vol. 9, pt. 2, p. 43, pl. 2, fig. 17, 1886.

C. mississippiensis, Ald., Bull. Am. Pal., vol. 1, p. 65, pl. 2, figs. 19, 19 a.

Aldrich and Meyer's original description—"Spire elevated. Whorls nine, slightly convex; the last four with an impressed line along the suture. Base of body whorl spirally striated. Columella excavated, anteriorly with three tubercles. Outer lip thickened, crenulated within by about seven striæ, of which one in the middle is the largest. Newton."

Aldrich remarks (*loc. cit.* p. 65) that the Woods bluff form "differs from the typical only by the plaits on the columella being nearly obsolete."

Type.—Aldrich's collection.

Specimen figured.—Aldrich's collection; from Woods bluff.

Mitrella alabamensis.

Pl. 7, fig. 15

Syn. *Latirus alabamensis* Ald., Bull. Am. Pal. vol. 1, p. 63, pl. 21, fig. 17

For Aldrich's original description.—(*Loc. cit.*)

I am inclined to think this and the following are both members of the *Columbellidæ*. Though they do not conform in general outline to typical *Mitrella*, they are perhaps as near that as any other established genus.

Locality.—Ala.: Hatchetigbee.

Type and specimen figured.—Aldrich's collection.

Trophon sublevis, sn.p.,

Pl. 8, fig's. 1 and 19?

Specific characterization.—Size and general form as indicated by the figure; whorls seven, embryonic three smooth, spire and body whorl smooth, polished, but with nine sharp-edged costae on each whorl, becoming somewhat pointed on the shoulder; faint undulations indicating indistinct, distant spirals between the ribs; outer lip thickened, with five crenulations within, the upper the stronger; no umbilicus.

Pl. 8, fig. 19 is a specimen belonging perhaps to a varietal form of this species. The substance of the shell is white, while that of *sublevis* is horn-color; the humeral points are more distant from the suture above; the shell is comparatively longer; the lip and hence every rib, while seeming to join onto the rib in the whorl above, turns abruptly to the left and joins really onto the next rib in advance. This specimen is from the Lea memorial collection, from Gregg's landing.

Locality.—Ala.: Gregg's landing.

Type and specimen figured.—Paleontological Museum, Cornell University.

Trophon caudatoides.

Pl. 8, fig. 2.

Syn. *T. caudatoides*, Ald., Bull. 1, Ala. Geol. Sur. p., 19, pl. 6, fig. 4, 1886.

Aldrich's original description.—"Shell with numerous varices; whorls seven, uppermost two smooth, the others angulated by the variceal nodes and crossed by a few revolving lines, which are rather coarse and somewhat alternate; one to four thickened lamelliform varices on different specimens at irregular distances apart. Aperture ovate; outer lip expanded and crenate within; columella smooth, twisted below; canal rather abruptly turned to the left.

"*Locality*.—Hatchetigbee bluff, Ala."

One specimen from the same locality has a much more complete spire, but less complete outer lip.

Type and specimen figured.—Aldrich's collection.

Trophon elegantissimus.

Pl. 8, figs. 3 and 6.

Syn. *Murex elegantissimus* Ald., Bull. Am. Pal., vol. 1, p. 65, pl. 5, fig. 3, 1895.

Aldrich's original description.—(*Op. cit.*)

It was most probably a form of this species that Aldrich characterized as "*Murex engonatus?* Con." in Bull. No. 1, Geol. Surv. Ala., p. 56, 1886, from Gregg's landing. I have little doubt that the larger specimen herewith figured is an adult form of this species. The type is herewith figured. See fig. 3.

Locality.—Ala.: Gregg's landing.

Type.—Aldrich's collection.

Trophon gracilis.

Pl. 8, fig. 4.

Syn. *Trophongracilis* Ald., Bull. 1, Geol. Surv. Ala., p. 19, pl. 5, fig. 6, 1886.

Fusus bellus (partim) de Greg. Eoc. Faun. Ala., p. 91, 1890.

Suessonia gracilis Cossm. Ann. Geol. and Pal. 1893, p. 35.

Aldrich's original description.—"Shell acuminate, whorls ten, rounded; spire high, with three embryonic whorls, the first two smooth, the next showing longitudinal varices, the balance with numerous (in the type nine) strong varices, which are, when perfect, thin, fringing and sigmoid; six or more revolving lines cut the edge of the varices into an equal number of crenulations, these revolving lines being strongest at their intersecting points; aperture ovate, terminating in a narrow canal which turns strongly to the left and slightly upward; outer lip sharp, thickened and crenulated within; three slight protuberances on the anterior part of the columella near the canal.

"*Locality.*—Lower bed, Woods bluff, Ala.

"Only two specimens found. This species is more acuminate and has a shorter canal than is usual in living forms."

Muricidea imbricatula.

Pl. 8, fig. 5.

Syn. *Latirus imbricatus* Har., Proc. Ac. Nat. Sci. Phila., 1891, p. 476, pl. 21, fig. 2.

"*Specific characterization.*—General form and size as indicated

by the figure: whorls 10; 1-4 embryonic, smooth; the remaining spiral whorls with about 7 costæ crossed by about 6 very strong revolving striæ between which there are an equal number of fine spirals. Labrum lirate within; columella very much twisted and showing signs of plications, especially at the basal angle. Umbilicus not large, but well defined. The most peculiar feature of this species is the imbricate appearance of the incremental lines. This strongly reminds one of some of the Muricidæ. The general form of the species is much like *Latirus rugatus* Dall from the Ballast Point Silex beds.

"*Locality*.—Woods bluff."

We are led to believe by new material that the striations on the columella referred to above are due to the revolving striæ showing through the thin columella collosity, and hence do not partake of the nature of those of *Latirus*. This is not far from *Trophon elegantissimus*, but differs in having much finer and more regular imbrications; with ribs, revolving lines, imbrications and all extending from suture to suture. The humeral region of *elegantissimus* is nearly plain.

Type.—Lea Memorial Collection, Acad. Nat. Sci., Phila.

Phyllonotus morulus,

Pl. 8, fig. 7.

Syn. See Bull. Am. Pal., vol. 1, p. 214, pl. 20, fig. 1, 1895.

Murex morulus Har., Proc. Ac. Nat. Sci. Phila., 1896, p. 476, pl. 20, fig. 12.

Conrad's original description.—See this work, vol. 1, p. 214.

Conrad's original specimen, the type, was doubtless obtained from Matthew's landing along with *Volutilithes limopsis*, *V. rugatus*, and *Exilia pergracilis*, though he did not state, nor did he doubtless know its exact provenance. It is, however, finely developed at Woods bluff, as shown by the accompanying figure.

Cornulina armigera,

Pl. 8, figs. 8-11.

Syn. *Melongina?* *armigera* Con., Foss. Sh. Tert. Form., No. 3, p. 30, Sept. 1833.

Fusus taitii Lea, Cont. to Geol., p. 152, pl. 5, fig. 159, Dec. 1833.

Monoceros armigerus Con., Foss. Sh. etc., 2d ed. p. 37, pl. 15, fig.

I, 1835.

Cornulina armigera Con., Proc. Ac., etc., 1853, p. 321.

Cornulina armigera Con., Amer. Jr. Conch., vol. 1, p. 21, 1865.

Cornulina armigera Ald., Geol. Surv. Ala., Bull. 1, pl. 50, 53, 1886.

Cornulina armigera Dall, Trans. Wag., etc., vol. 3, p. 118.

Conrad's original description.—"Shell subglobose, ponderous; body whorl with a double row of short, thick spines, one on the shoulder, the other near the middle: three or four strongly impressed lines towards the base: columella and lip callous; basal emargination profound, spire subconical, convex, constituting nearly half of the shell, the humeral spires revolving upon it. Length $2\frac{1}{2}$ inches; breadth 2 inches.

"*Locality*.—Claiborne, Ala.

"Cab. Acad. N. S."

This species shows a considerable variation as to ornamentation. The Gregg's landing specimen herewith figured shows but one row of spines; that at Nanafalia shows a rudimentary series below; while the Hatchetigbee specimen has three rows.

Lignitic localities.—Ala.: Yellow bluff; Nanafalia; mouth of Bashi creek; Gregg's; Nanafalia; Woods bluff; Hatchetigbee.

Texas: Sabinetown.

Triton tuomeyi,

Pl. 8, fig. 12.

Syn. *Ranella* (*Argobuccinum*) *tuomeyi* Ald., Bull. 1. Geol. Surv. Ala., p. 20, pl. 3, fig. 3, 1886.

Aldrich's original description.—"Shell oblong-ovate, canal strongly recurved, bent upwards; whorls seven; spire elevated, pointed, the first two whorls smooth, the others cancellated, the longitudinal lines forming tubercles at intersections; tubercles sharp, transverse, strongly developed on the periphery of the body whorl and next one above, generally three large ones on the body whorl between the varices; transverse striae numerous, composed of coarse lines, having three finer ones between, and others between these; line of growth fine; varices strong, pitted on the back side; suture impressed, slightly shouldered; aperture ovate; outer lip with a strong varix, nine tubercles within, canal nearly as long as the aperture.

"*Locality*.—Lower bed, Woods bluff, Ala.

"Young shells show more tubercles between the varices than the type. Named in honor of the late Prof. Michael Toumey."

So far we have observed this species only at Woods bluff, though it doubtless will be found elsewhere at a similar horizon. In the type specimen the varices happen to be continuous, one above the other, but that is not true of the specimen herewith figured. In this, the varices of each succeeding whorl surpass those of the whorl before by one rib-space. It seems that Fischer is right in referring "*Ranella*" *gigantea* of the Mediterranean to the genus *Triton*, on account of its lack of a posterior canal. The species *tuomeyi* certainly falls in the same group with *gigantea*.

This differs from *showalteri* by its different location of the varix before the aperture and the less pronounced angulation of the whorls.

Type.—Aldrich's collection.

Specimen figured.—Paleontological Museum, Cornell University.

Triton (*Ranularia*) *eocensis*,

Pl. 8, fig. 13.

Syn. *Fulgur eocense* Ald., Bull. Am. Pal., vol. 1, p. 62, pl. 4, fig. 7, 7a.

T. (Ran.) eocensis Har., *idem*. p. 215, pl. 20, fig. 3.

T. (Ran.) eocensis Har., Proc. Ac. Nat. Sci. Phila. 1896, p. 479, pl. 23, fig. 1.

For Aldrich's original description.— (*Loc. cit.*)

As observed in my article published in the Proceedings of the Academy of Natural Sciences of Philadelphia, "this is the most perfect specimen of this species yet found." Its apex is somewhat eroded and might be represented a little more acute. Strangely enough, it does not show varices on the whorls, as is usual in specimens of this species.

Lignitic locality.—Ala.: Gregg's landing.

Type.—Aldrich's collection.

Triton (*Epidromus*) *otopsis*,

Pl. 8, fig. 14.

Simpulum otopsis Con., Museum, Acad. Nat. Sci. Phila. (Conrad's original label).

Syn. *Simpulum autopsis* Con., Jr. Acad. Nat. Sci. Phila., vol. 4, p. 293, pl. 47, fig. 25, 1860.

S. (Epidromus) otopsis Con., Am. Jr. Conch., vol. 1, p. 20, 1865.

Conrad's original description.—"Subfusiform; whorls rounded, seven in number, cancellated; revolving lines most conspicuous, alternated in size, the largest beaded finely, and about fourteen in number on the body whorl, exclusive of beak; aperture with beak about half the length of the shell; apex obtuse, three first whorls smooth and the second and third turned. Length $1\frac{1}{8}$ inch."

This is put by Conrad along with his specimens from "a locality farther north in Alabama than any Mr. Tuomey had explored." So far I have collected no specimens of this species and the specimens sent me under this name by Aldrich are *Cancellaria*. If Eocene at all it will doubtless be discovered at Bell's, Gregg's, or Matthew's landing.

Type and specimen figured.—Acad. Nat. Sci. Phila.

Very kindly loaned me for examination and figuring by the officers of that institution.

Fusoficula juvenis,

Pl. 8, figs. 15 and 16.

Syn. See Bull. Am. Pal., vol. 1, p. 216.

Two extreme varieties have been chosen for figuring. Any shade of intermediate mutations can be obtained from any good locality like Woods bluff. The apex of this species is formed by (1) a very small smooth whorl nearly enclosed by (2) a much larger smooth whorl followed by (3) about one-third of a volution characterized by spiral striations and afterward by vertical heavy lines, then (4) a slight non-conformability with a slight varix, then the remainder of the whorls ornamented as shown by the figures. The above-mentioned embryonic whorls are set at a slightly different angle from the axis of the remaining spirals. In old specimens the labrum is thickened within.

Lignitic localities.—Ala.: Gregg's landing; Lower Peach Tree; Woods bluff; Hatchetigbee; 3 mi. s. w. of Thomasville. Aldrich reports it also from Bell's; Tusahoma; Nanafalia; Butler.

Texas: Sabinetown.

Specimen figured.—Perfect form from Gregg's; fragment from Woods bluff.

Now in Paleont. Mus., Cornell Univ.

Fulguroficus triserialis,—

Pl. 8, fig. 17.

Syn. *Fulgur triserialis* Whitf., Amer. Jr. Conch., vol. 1, p. 260, 1865.

Pyrula smithii (Sow.) Ald., Jr. Cin. Soc. Nat. Hist., July, 1885.

Fulgur triserialis Ald., Bull. 1, Geol. Surv. Ala. 1886, p. 24, pl. 1, fig. 23b.

Fulguroficus argutus Clark, U. S. G. S., Bull. 141, p. 68, pl. 12, fig. 1, 1896.

Whitfield's original description.—"Shell thin, clavate or pyriform; spire short, consisting of four (or more) volution, flattened above, and produced below into a long, slender canal; marked on the periphery or largest part of the volution by three rows of lanceolate nodes or subspines, the upper one being the most prominent; aperture large elongate elliptical; canal straight; columella slender and smooth; entire surface marked by sharp revolving lines.

"*Locality*.—Nine miles below Prairie Bluff, Ala."

The ornamentation on Gregg's and Bell's landing specimens is quite variable and the *argutus* type is represented.

Not uncommon at Gregg's landing, where doubtless Whitfield's specimens were obtained. Also found at Bell's.

Type.—Hall's collection.

Specimen figured.—Paleont. Mus., Cornell Univ.

Cassidaria brevidentata, var.

Pl. 8, fig. 18,

Syn. *C. brevidentata* Ald., Jr. Cinn. Soc. Nat. Hist., 1885, p. 152, pl. 3, fig. 20.

C. crevidentata Ald., Geol. Surv. Ala., Bull. 1, pl. 1, fig's. 19, 20.

C. brevidentata Har., Proc. Ac. Nat. Sci. Phila., 1896, p. 479, pl. 22, fig. 10.

Aldrich's original description.—"Shell oblong-oval, whorls seven; suture channeled; surface covered with fine revolving striæ; coarser, distant lines upon the body whorl, giving the shell the carinated aspect of the genus; lines of growth fine, a few coarser ones showing on the line of the tubercles; apex

smooth; whorls of the spire carinate and slightly tubercled; a row of upright longitudinal nodes on the shoulder of the body whorl, none below; a single, strong varix on the body whorl; aperture ovate; inner lip spread over the whorl, with three plications on the upper part, smooth in the central part and plicate below; outer lip reflected, plicate on the inner edge above and below, smooth in the center; canal narrow, strongly twisted. Length 1.4; breadth .9.

“*Locality*.—Red bluff, Miss.

“This species differs from *C. carinata* Lam. in having a single, strong varix. It is lighter in substance. I describe it with reluctance, basing its specific difference principally upon the presence of the strong varix.”

As stated in the Proc. Acad. Nat. Sci. Phila., p. 479, “This specimen shows an unusually large number of nodules on the humeral carina. In front, the two lower carinæ are without nodules, while on the back all three carinæ are strongly nodular.

“*Locality*.—Bell’s landing, Ala.”

We have found no additional specimens.

Cassidaria dubia Ald.

Syn. *C. dubia* Ald., Jr. Cinn. Soc. Nat. Hist., 1885, p. 153, pl. 3, fig. 21.
C. dubia Ald., Geol. Surv. Ala., Bull. 1, p. 33, pl. 1, fig. 21, 1886.

Aldrich’s original description.—“Shell ovate; whorls, six to seven; sculptured the same as *C. carinata* Lam; nodes sharp, longitudinal, situated on the shoulder of the body whorl; suture channeled; whorls of the spire with a circle of nodes, sub-central; outer lip toothed above and plicate on the whole of the inner edge; inner lip strongly plicate-costate its entire length; toothed above. Length about one inch; breadth .7.

“*Locality*.—Headwaters of Bashia creek, Clark county, Ala., near Woods bluff.

“Differs from all other species mentioned in the plications of the aperture. Prof. A. Heilprin (Proc. Acad. Nat. Sci., 1880, p. 365), in his list of fossils from Cave Branch, mentions a ‘*Cassidaria* (fragment) closely allied to *C. carinata* Lam,’ which is no doubt the species above described.”

We have found nothing but fragments of this species in the Lignitic, and the type figured by Aldrich is quite imperfect. When better material is obtained it can be figured to advantage.

Cypræa smithii,

Pl. 8, fig. 2c.

Syn. *C. smithii* Ald., Geol. Surv. Ala., Bull. 1, 1886, p. 33, pl. 5, fig. 3.

C. smithi Har., Proc. Acad. Nat. Sci. Phila., 1896, p. 477, pl. 21, fig. 4.

Aldrich's original description.—"Shell oblong-ovate, rather flat, surface smooth; labrum crenulate within, smooth on the base and flattened, reflected somewhat and raised above base of shell; aperture slightly crenulate within, expanded below.

"*Locality.*—Gregg's landing, Ala."

Also found at Woods bluff, where it "is broader posteriorly than typical *smithi*, and has a less conspicuous posterior termination of the labium, yet it is most likely of the same species. It seems to be the forerunner of *C. dalli* Ald."—Har.

Type.—Aldrich's collection,

Aporrhais gracilis,

Pl. 9, fig. 1.

Syn. *A. gracilis* Ald., Geol. Surv. Ala., Bull. 1, 1886, p. 32, pl. 5, fig. 14.

Aldrich's original description.—"Shell fusiform, whorls eight, spire high; embryonic whorls smooth, the others to the body whorl with longitudinal ribs which curve to the left into the suture and are crossed by fine revolving lines; body whorl expanded into a broad outer lip, furnished with two digitations, the posterior one the largest, rising in some specimens into a long, sharp point, strongly grooved to the apex. The outer lip extends up the spire to the top of the body whorl only; the groove in the anterior digitation rather faint; surface of body whorl with two revolving carinæ marking these grooves and covered with faint revolving lines; aperture small, inner lip with a spreading callus; canal moderate, terminating in a sharp point slightly recurved.

"*Locality.*—Gregg's landing, Ala.

"Quite common; the digitations are subject to considerable variation, the younger forms have only the posterior one.

"The embryonic apex is missing in every specimen. One example has made a double outer lip; the posterior digitation lying over each other and distinct; the anterior ones coalescent."

Calyptrophorus trinodiferus

Pl. 9, fig. 2, a.

Syn. *C. trinodiferus* Con., Proc. Ac. Nat. Sci. Phila., 1857, p. 166.

Colyptrophorus Gabb., A. J. Conch. vol. 4, 1868, p. 142, pl. 13, fig. 10.

C. trinodiferus Con., J. Ac. Nat. Sci. Phila., vol. 4, pl. 47, fig. 29.

Conrad's original description.—"Subfusiform, with three distant nodes on the upper part of the body volution; spire subtriangular, having curved longitudinal ribs visible beneath the tunic; rostrum of the spire elongated and curved; labrum with a prominent angle above.

"From the Eocene of Alabama, Mr. Showalter."

Heilprin has improperly put "Claiborne, Ala." on Conrad's label.

Localities.—Ala.: Bell's and Gregg's landings; 4 mi. above Hamilton bluff, Ala. river; Hatchetigbee; Woods bluff; Tusahoma.

Tex.: Sabinetown.

Type.—Phila. Academy.

Specimen figured.—From Gregg's; Paleont. Mus. Cornell Univ.

Melania sylværupis, n. sp.

Pl. 9, fig. 10.

Specific characterization.—Size and form as indicated by the figure; spiral whorls but slightly inflated above, but becoming more carinated below; body whorl very angular or carinate with nine short oblique costæ, marked below by a few rather faint revolving lines. The only specimen known is somewhat incomplete, but it shows very distinctly a new form of a brackish or fresh water type in this generally marine fauna.

Locality.—Ala.: Woods bluff.

Type.—Lea Memorial collection, Paleont. Mus., Cornell Univ.

It is quite probable that land shells also may be found at Woods

bluff, since silicious pebbles fully $\frac{1}{2}$ inch in diameter are not uncommon, showing that land and inflowing streams were not far away when these beds were being laid down.

Melania trigemmata,

Pl. 9, fig. 3, a, b.

Syn. *Turbonilla* (*Chemnitzia*) *trigemmata* Con., Jour. Acad. Nat. Sci. Phila., vol. 4, p. 288, pl. 47, fig. 33.

T. (C.) trigemmata Ald., Geol. Surv. Ala., Bull. 1, p. 52, 1886.

Scalardia? trigemmata de Greg., Mon. Faun. Eoc., etc., p. 131, 1890.

Rissoia? trigemmata Con., Annal. Geol. et Pal., 1893, p. 27.

Conrad's original description.—"Turrated; whorls seven convex; ribs distant, with three subequal tubercles; the ribs become obsolete towards the suture, where there are two revolving lines, minutely beaded in a line with the ribs; suture profound, an impressed line revolving immediately above; base with six revolving carinated lines. Length $1\frac{1}{4}$ inches.

"Accompanying the above are specimens of univalves embracing the following Eocene species: *Mitra pædilis* C., *Cancel-laria gemmata* C., *C. alvaata* C., *Calyptrophorus trinodiferus* C. All except the last are Claiborne species."

Probably related to "*Terebra*" *plicifera* Heilp. Some specimens have a close resemblance to *Melania præcessa* Desh.

Locality.—Ala.: Woods bluff.

Specimen figured.—Paleontological Museum, Cornell University.

Potamides fulvarupis, n. sp.

Pl. 9, fig. 4.

Specific characterization.—Form and size as indicated by the figure; whorls increasing rapidly in size and giving the shell a ventricose appearance; upper whorls with traces of costations from suture to suture, but only evident near the upper part of the whorl, where there is a broad, low or vertically compressed nodule on what would be the upper portion of each rib. Just above and below this row of nodules there is a well marked depression or depressed broad line. Traces of two low, broad spirals are on the whorls below the crenules; on the body whorl there are also four strong basal spirals. Lines of growth are not

evident, but there was probably a considerable backward swing to them in the middle of each whorl.

Closely resembles specimens in the Lower Eocene of the Paris basin.

Localities.—Ala.: Yellow bluff; Bell's landing.

Type and specimen figured.—Yellow bluff; Lea Memorial collection, Acad. Nat. Sci. Phila.

***Cerithium delicatulum*,**

Pl. 9, fig. 5.

Syn. *Cerithium delicatulum* Ald., Bull. Am. Pal., vol. 2, p. 179, pl. 2, fig. 9.

For Aldrich's original description, see above reference.

Locality.—Ala.: Hatchetigbee bluff.

***Cerithium tombigbeense*,**

Pl. 9, fig. 6.

Syn. *C. tombigbeense* Ald., Bull. 1. Geol. Surv. Ala., 1886, p. 34, pl. 3, fig. 7.

P. (Cerithium) tombigbeensis Dall., Tr. Wag., etc., vol. 3, p. 287.

Aldrich's original description.—"Shell elongated, whorls probably twelve; suture distinct, situated in a depressed space; surface of the uppermost whorls smooth, those following transversely striated, the lower ones with numerous oblique longitudinal ribs, rising into tubercles on the center of the body whorl and the two next above; a wavy line just below the suture, making a slight shoulder to the whorls. Lines of growth sigmoid, fine and numerous upon the body whorl, obsolete above. Aperture ovate, outer lip reflected below, making a short, open canal.

"*Locality*.—Woods bluff, Ala.

"Only one specimen found; the mouth is broken away, rendering it impossible to determine its generic position absolutely. The apex is also missing, but is probably sharp. Suggests the genus *Melania*."

***Cerithiopsis fluviatilis*,**

Pl. 9, fig. 7.

Syn. *C. fluviatilis* Ald., Bull. Am. Pal., vol. 2, p. 178, pl. 2, fig. 3.

For Aldrich's description, see the above reference.

Localities.—Ala.: Woods bluff; Choctaw corner.

Specimen figured.—Aldrich's specimen from Choctaw corner.

***Cerithiopsis conica*,**

Pl. 9, fig. 8.

Syn. *C. conica* Ald., Bull. Am. Pal., vol. 2, p. 178, pl. 2, fig. 4, 1897.

For Aldrich's description, see above reference.

The specimens in hand, from Woods bluff, agree very well with Aldrich's description and figure, except his specimen was much smaller than this, and no mention is made of the raised lines or plaits on the columella. The largest whorl of our specimen has a somewhat finer costation than the upper whorls have; the costæ are more arcuate and thread-like.

Lignitic locality.—Ala.: Woods bluff.

Specimen figured.—Paleontological Museum, Cornell University.

***Cerithiopsis terebropsis*,**

Pl. 9, fig. 9.

Specific characterization.—Size and form as shown by the figure; whorls with four distinct, raised lines or bands, crossed by a large number of nearly vertical ribs, nodular at intersections of spirals; base marked by about six strong spirals, diminishing in strength anteriorly; columella biplicate within, but this feature does not show from the outside in perfect specimens; plications extend to apex, as proven by broken specimens; columella somewhat callous at aperture; columella perforate, when viewed from below.

Locality.—Ala.: Woods bluff.

Type.—Paleontological Museum, Cornell University.

***Serpulorbis sylværupis*, n. sp.**

Pl. 10, fig. 1.

Specific characterization.—Size and general appearance as figured; exterior marked by about twenty primary and an equal number of secondary longitudinal, raised lines, the former granular or nodose; smaller end of the shell nearly or quite smooth.

Locality.—Ala.: Woods bluff.

Type.—Paleontological Museum, Cornell University.

Turritella clevelandia, var.

Pl. 10, fig. 2.

Syn. *T.?* *carinata* Ald., Geol. Surv. Ala., Bull. 1, p. 52, 1886.*T. clevelandia* Har., Geol. Surv. Ark., Rept. for 1892, vol. 2, p. 176, pl. 6, fig. 9, 1894.

This Lignitic form corresponds more nearly to *clevelandia* than any other described species; though it is with some hesitation that I place this under that name. The sutures are more deeply impressed in *clevelandia* and the spiral marking more pronounced, as will appear from the original description of that species:

Harris' original description.—"Size and general form as indicated by the figure; whorls 13 or 14; generally ornamented by about three prominent revolving lines and a few subordinate ones; from the uppermost and lowermost of the revolving lines the whorls slope abruptly to the suture, while between these lines the sides of the whorls are straight."

The type of *clevelandia* is from the Jackson beds of Arkansas and is deposited in the collection of the U. S. Nat. Mus.

Lignitic localities.—Ala.: Woods bluff; Ozark; 4 mi. above Hamilton bluff; Hatchetigbee?; 3 mi. s. w. of Thomasville.

Specimen figured.—Woods bluff; Paleontological Museum, Cornell University.

Turritella mortoni.

Pl. 10, fig's. 3, 4.

Syn. *T. mortoni* Con., Jour. Acad. Nat. Sci. Phila., vol. 6, p. 221, pl. 10, fig. 2, 1830.*T. carinata* de Greg. (*ex. parte*) Mon. Faun. Ala., 1890, p. 122, pl. 11, fig's. 3, 4, 5.*T. mortoni* Har., Bull. Am. Pal., vol. 1, p. 224, 1896.

Conrad's original description.—"Shell turreted, conical, thick, with revolving distant, and finer intervening, striæ; whorls with an elevated acute carina near the base of each; volutions about eleven, and the striæ are the largest on the elevations of the whorls, which are slightly concave above and abruptly terminate at the sutures; the lines of growth on the last whorl are strong and much undulated.

"I dedicate this species to my friend Dr. S. G. Morton, who has so ably illustrated the geology of this country connected with its organic remains.

"Cabinet of the Academy."

This is one of the most abundant and characteristic species of our lower Eocene deposits both in the Gulf and Chesapeake embankments. It presents a great many varietal forms in the Lignitic and finally merges into *T. carinata* of the Claiborne Eocene. We have noted in the American Journal of Science, vol. 47, p. 302-303, fig's. 1, 2, 1894, the form or variety styled *post-mortoni* from the Lignitic of Alabama (called *carinata* by de Greg.) characterized by comparatively faint spiral striation and by a sharp, strong carina not so basally located as in the typical form. This variety leads up to the form found in the Lower Claiborne beds at Lisbon and elsewhere, and this in turn to the typical *T. carinata* Lea.

Lignitic localities.—Ala.: Tuscahoma; Nanafalia; Yellow bluff; Bell's landing; Gregg's landing.

Ga.: Ft. Gaines.

Va.: Ratcliff wharf, Rapp. R.; Evergreen; Aquia creek; Potomac creek.

Md.: Ft. Washington.

Specimens figured.—Fig. 3, Nanafalia; fig. 4, Bell's; Paleontological Museum Cornell University.

***Turritella humerosa*,**

Pl. 10, fig's. 5, 6, 7.

Syn. *T. humerosa* Con., (See Bull. Am. Pal., vol. 1, p. 224).

The more typical form is represented by fig. 5. Fig. 6 is Whitfield's *multilira* and fig. 7 is Whitfield's *eurynome* and also practically Aldrich's *bellifera* (Jr. Cinn. Soc. Nat. Hist., July 1885, p. 150, pl. 3, fig. 13. See also Jr. Cinn. Soc. Nat. Hist., July 1887, p. 81). The species is extremely variable in surface marking, but there is no chance for drawing lines of specific demarcation within its bounds. All shades of variation occur in one and the same bed. It ranks secondary to *mortoni* as a typical lower Eocene species.

Lignitic localities.—Ala.: Nanafalia; Tuscahoma; Yellow bluff; Bell's and Gregg's landings.

Va.: Evergreen; Aquia creek; Potomac creek; Ratcliff wharf.

Md.: Ft. Washington.

Specimens figured.—Fig. 5, Nanafalia; fig. 6, Gregg's landing; fig. 7, Bell's landing; Paleontological Museum Cornell University.

***Turritella præincta*,**

Pl. 10, fig. 8.

Syn. *Turritella præincta* Con., Proc. Ac. Nat. Sci. Phila., 1864, p. 211.

Conrad's original description.—"Turrited, broad at base; sides straight; a profoundly elevated, thick, angular carina revolves at the summit of each volution, gradually disappearing at the fourth whorl; carina slightly channeled above and having a single revolving line beneath its juncture with the whorls, which have each three revolving lines, the inferior one most prominent. Length $3\frac{5}{8}$ inches; width of body whorl, independant of carina, $\frac{3}{4}$ inch.

"*Locality*.—Dallas Co.? Alabama Eocene.

"This large species differs from *T. mortoni* in having a larger and more amply elevated carina, larger and fewer revolving striæ, etc. It is allied to *T. rotifera* Lam. The specimen described was loaned for the purpose by Mr. R. P. Whitfield. Other specimens are in Barnum's Museum, N. Y."

As a rule there is no need of confounding this with any other *Turritella*, but some of the large Yellow bluff specimens are intermediate between this and *humerosa*.

Localities.—Ala.: Gregg's landing; Bell's landing; Yellow bluff; Tuscahoma.

Va.: Aquia creek.

Type?

Specimen figured.—Gregg's landing; Paleont. Mus., Cornell University.

***Mesalia pumila*, var. *alabamiensis*,**

Pl. 10, fig. 9.

Syn. See Bull. Am. Pal., vol. 1, p. 226 and 227, pl. 22, fig. 1, 1896.

This is an extremely variable form, as noted on the pages of Bull. Am. Pal., vol. 1, just referred to. The figure herewith given shows a typical form of the variety *alabamiensis*. Others at Nanafalia show ornamentation like that of typical *pumila*, though perhaps the revolving lines are a little more sharply carinate. In the same bed are typical *alabamiensis*. Gregorio has suggested the reference of *alabamiensis* to *vittata* Lam. The resemblance is occasionally striking.

Lignitic localities.—Ala.: Gregg's and Bell's landings; Yellow bluff; Pine Hill; Nanafalia.

Melanopsis planoidea,

Pl. 10, fig. 10.

Syn. *M. planoidea* Ald., Bull. Am. Pal., vol. 1, p. 67, pl. 3, fig. 7, 1895.

Aldrich's original description.—(Loc. cit.)

As remarked below, this is doubtless the normal form, while *anita* is an old incrassated form of the same species.

Locality.—Ala.: Gregg's landing.

Type and specimen figured.—Aldrich's collection.

Melanopsis anita,

Pl. 10, fig. 11.

Syn. *Melanopsis anita* Ald., Geol. Surv. Ala., Bull. 1, 1886, p. 35, pl. 5, fig. 12.

Pasithea anita de Greg., Faun. Eoc. Ala., 1890, p. 164.

? *Melanopsis planoidea* Ald., Bull. Am. Pal., vol. 1, p. 67, pl. 3, fig. 7, 1895.

Aldrich's original description.—"Shell ovate, spire short, surface smooth, body whorl large; aperture large, angular posteriorly, caused by a thick deposit of callus; outer lip sharp, thin; callus reflected below, terminating in a small excision.

"*Locality.*—Ala.: Gregg's landing."

This seems to be a true *Melanopsis*, though it may be an offshoot of *Bullia* or *Pasithea*. I am inclined to think this is but an old incrassated form of *M. planoidea*.

Locality.—Ala.: Gregg's landing.

Type and specimen figured.—Aldrich's collection.

Tuba antiquata,

Pl. 10, fig. 12.

Syn. *Littorina antiquata* Con., Foss. Sh., etc., Sept. 1883, p. 35.

Tuba alternata Lea, Cont. to Geol., Dec. 1833, p. 128, pl. 4, fig. 118.

Tuba striata Lea, *idem*, p. 128, pl. 4, fig. 117.

? *Tuba sulcata* Lea, *idem*, p. 129, pl. 4, fig. 119.

Tuba antiquata Ald., Geol. Surv. Ala., Bull. 1, 1886, p. 53.

Tuba striata Dall, Trans. Wag., etc., vol. 3, p. 320, 1893.

Tuba antiquata Ald., Bull. Am. Pal., vol. 2, p. 173, pl. 5, fig. 7.

Conrad's original description.—“Shell conic-acute, somewhat ventricose, with numerous revolving, very elevated lines, alternating with smaller ones, and longitudinal approximate, regular striæ; sutures deeply impressed; whorls convex; umbilicus distinct, rounded; mouth orbicular; slightly contracted by the rotundity of the penultimate whorl. Length $\frac{1}{2}$ an inch.

“*Locality.*—Claiborne, Ala. Cab. Acad. N. S.”

Lignitic localities.—Ala.: Woods bluff; Choctaw corner.

Type.—Academy of Natural Sciences, Philadelphia.

Specimen figured.—Aldrich's specimen and figure, (young).

Solarium sylværupis,

Pl. II, fig. I.

Syn. *S. texanum* Dall, (*non* Gabb), Trans. Wag., etc., vol. 3, p. 326.

S. sylværupis Har., Proc. Ac. Nat. Sci. Phila., 1896, p. 477.

The only description this form has had is by Dall. He says: “The upper surface without spiral striation, the middle of the whorl impressed, the suture simple-edged except in the very young, the periphery wider and less decumbent; the umbilicus smaller with the carina very finely transversely wrinkled, the base smooth or with a few obsolete spiral lines.” It is here compared to *S. scrobiculatum*.

Having examined the type of *S. texanum* in the Academy's collection, it appears that *S. texanum* is synonymous with *scrobiculatum*, hence the necessity of the new name proposed in the Academy's Proceedings.

Localities.—Ala.: Woods bluff; near Choctaw corner.

The type of this new species may be considered to be the specimen herewith figured, from Woods bluff, in the Paleontological Museum of Cornell University.

Solarium cupola,

Pl. II, fig. 2.

Syn. *S. cupola* Heilp., Proc. Ac. Nat. Sci. Phila., 1880, p. 375, pl. 20, fig. 14.

S. cupola Ald., Bull. 1, Geol. Surv. Ala., 1886, p. 51.

S. cupola Dall, Tr. Wag., etc., vol. 3, p. 326, 1893.

Heilprin's original description.—“Shell convexly conical, mound-like, of about five volutions; whorls ornamented with

alternating coarse and very fine concentric lines, and appearing double from a medial impression (the shell apparently of twice the number of volutions that it actually possesses); base similarly ornamented as the upper surface, convex, and strongly margined by the prolongation inferiorly of the outer wall; umbilical margin finely crenulated, the umbilicus broadly open, and exhibiting the concentrically striated internal volutions of the apex; aperture rhomboidal.

"Length, $\frac{2}{3}$ inch; diameter, $1\frac{1}{4}$ inch. Cave branch; Knight's branch; Woods bluff, Clarke Co., Ala."

Localities.—Ala.: Woods bluff; near Choctaw corner.

Aldrich gives also: Bethel; Butler; 4 mi. s. Mt. Sterling.

Specimen figured.—Woods bluff; Paleontological Museum, Cornell University.

***Solarium huppertzi* var.**

Pl. II, fig. 3.

Syn. *S. huppertzi* var. Har., Proc. Ac. Nat. Sci. Phila., 1896, p. 477, pl. 21, fig. 5.

S. huppertzi was described from Smithville, Bastrop Co., Tex., in the Proc. Ac. Nat. Sci. Phila., 1895, p. 83, pl. 9, fig's. 10, 10 a. We postpone a full discussion of this species till our next bulletin, for doubtless more light will be had on the subject from collections of Lower Claiborne horizon from Louisiana. Suffice it to say here, as we did in the Academy's Proceedings for 1896, that this form or variety has much finer markings and granulations than typical *huppertzi* has.

Locality.—Ala.: Woods bluff; now in both Cornell Univ. Mus. and that of the Acad. Nat. Sci. Phila.

Specimen figured.—Lea Memorial Collection, Acad. Nat. Sci., Phila.

***Solarium greggi*,**

Pl. II, fig's. 4, a.

Syn. *S. greggi* Har., Proc. Ac. Nat. Sci. Phila., 1896, p. 480, pl. 23, fig's. 5, 5a.

Harris' original description.—"Whorls about five. Nuclear whorls rounded, smooth; remaining whorls with three crenulate spiral lines and one smooth, strong spiral line just above the

suture. Periphery about the body whorl with one deeply incised spiral line, thus rendering it obtuse. Umbilicus small, with radii from its periphery about one-third way across the body whorl, and having a raised spiral coarsely crenulate carina medially located."

Locality.—Ala.: Gregg's landing.

Type and specimen figured.—Lea Memorial Collection, Acad. Nat. Sci. Phila.

Solarium elaboratum,

Conrad's original description.—(A. J. S., vol. 23, p. 344, 1833)
"Shell discoid, with numerous revolving crenulated striæ of different sizes; beneath slightly channeled on the sub-margin, with a few strong grooves; margin of the umbilicus profusely crenulated; the crenulations extending to the apex; aperture nearly circular. Length, one-third of an inch.

"*Locality*.—Claiborne, Ala."

Variety **delphinuloides** Heilprin;

Pl. II, fig. 5,

Syn. *S. delphinuloides* Heilp., Proc. Ac. Nat. Sci. Phila., 1880, p. 375, pl. 20, fig. 13.

S. delphinuloides Ald., Geol. Surv. Ala., Bull. 1, p. 51.

S. delphinuloides Dall, Trans. Wag., etc., vol. 3, p. 324.

Heilprin's original description.—"Shell convexly conical, of about seven volutions; the whorls ornamented with several beaded revolving lines, two or more of which near the upper margin, and one near the basal margin being the most prominently defined; base convex sub-marginally channeled, and ornamented with numerous finely beaded revolving lines, which become more prominent in the umbilical region; umbilical volutions distinct to the apex, transversely striated, supermedially carinated; umbilical margin crenulated; aperture subcircular.

"Length, $\frac{1}{2}$ inch; diameter, $\frac{3}{4}$ inch; Woods bluff, Clarke Co., Ala."

This differs from *elaboratum* principally by its generally lower form, more finely yet more prominently beaded lines, with an unusually strong spiral some little distance above the periphery and suture.

Specimen figured.—Woods bluff; Paleontological Museum, Cornell University.

Variety *intusum* var. nov.

Pl. 11, fig. 8.

Syn. *S. delphinuloides* Ald., Geol. Surv. Ala., 1886, Bull. 1, p. 57.

S. elaboratum Dall, Trans. Wag., etc., vol. 3, p. 324, 1893.

Differs from *elaboratum* by having two sub-equal umbilical ribs, by having its periphery well rounded or obtuse, by its more depressed form. The diagonally elongated crenulations on the striae resemble closely those on *elaboratum*, though there is more similarity in the strength of the lines and markings above than there is in typical *elaboratum*.

Localities.—Ala.: Gregg's landing and Yellow bluff.

Type of variety.—Paleont. Mus., Cornell Univ.; from Gregg's.

Solarium leanum,

Pl. 11, fig. 6.

Syn. *S. leanum* Dall, Trans. Wag., etc., vol. 3, p. 325, pl. 22, fig. 12.

Dall's description is as follows: "The umbilical carina is annulate with nineteen strong, transversely-ruled tubercles, separated from the strong similar umbilical rib by an excavated sulcus; the rib is prominent, and looks, to a casual inspection, as if it were the top of the umbilical wall of the whorl, which is not the case; the shell is depressed, with a wide, thin carina, blunt and slightly undulate on the edge; both the under and upper surfaces of the whorls are concave; the keel overhangs the suture in front; the base outside of the umbilical carina is smooth, with a single fine thread in the bottom of the excavation; on the summit, above the keel, are four fine beaded or undulated spirals, separated by much wider interspaces, those next the suture stronger than the other two. Alt. 5.5; diam. 11.0 mm.; the apical whorls are estimated for, being defective in the type." Wautubbee, Miss.

The markings on the specimen herewith figured are a little more pronounced than Dall's description would indicate. Below towards the exterior there are several fine spiral lines.

Locality of specimen figured.—Ala.: Hatchetigbee.

Type.—National Museum, Washington, D. C.

Specimen figured.—Lea Mem. Coll., Phila. Acad.

Solarium bellense n. sp.,

Pl. II. fig. 7°

? *S. scrobiculatum* Ald., Geol. Surv. Ala., 1886, Bull. I, p. 57.

Specific characterization.—Size and general form as indicated by the figure; whorls about six; surface above covered with a great number of very fine revolving lines, with a trace of a large revolving line just above the suture; below with somewhat coarser alternating spirals and near the periphery showing one strong raised line; umbilical carina without traces of dentition; lines of growth on umbilical wall nearly vertical near the umbilical carina but, just before reaching the whorl above, swinging forward and truncated by a well-defined spiral sulcus.

Locality.—Ala.: Bell's landing.

Type and specimen figured.—Lea Mem. Coll., Phila. Acad.

Solarium sp.

Dall mentions *S. scrobiculatum* Con. and *S. cossmanni* Dall from Gregg's landing. We have as yet not found them in our Lignitic collections.

Discohelix verrilli, nov. sp., (by Aldrich),

Pl. II, fig's 9, a.

Syn. *Orbis rotella* Ald., non Lea, Geol. Surv. Ala., 1886, Bull. I, p. 53.

Aldrich has sent the following description of this new species, not in our collections:

"Shell of medium thickness, flattened above, with straight side meeting the upper surface at quite an angle; base extremely excavated, showing all the whorls which are six in number. Surface of the whorls nearly smooth, showing some very fine radial lines of growth, the outer edge of each whorl bordered by a raised and beaded rib, this line showing both above and beneath. The flattened outer edge of the body whorl bears a second beaded line above and two raised ones below near base with two or three very faint lines between. The apex is depressed below the plane of the top and the nucleus is smooth and inverted. Aperture semi-quadrate, wider at the outside, the whole aperture standing at an angle to the body of the shell; interior is thickened somewhat at the intersection of the angles.

"This shell is extremely rare. I found one specimen in 1885 and listed it in Bull. No. 1, Ala. Geol. Surv., 1886, p. 53, as *Orbis rotella* Lea. I have lately found two more specimens.

"The largest example is 15 mm. in width and 4 mm. high.

"This species differs from *Orbis rotella* Lea in size, in its aperture being more quadrate, whorls greater in number, and also in the extremely excavated base.

"*Locality*.—Choctaw Corner; Woods Bluff horizon."

Aldrich sent us a pencil drawing by Dr. Otto Meyer of the original discovery, and from this we have made our figures.

Hipponyx sylværupis n. sp.

Pl. 11, fig. 10, a.

Specific characterization.—Size and form as indicated by the figure; beak eroded but showing little tendency to overhang; radii large, irregular, interrupted by deeply-incised lines, rendering them difficult to follow; each costal segment as it appears between two lines of growth is usually a little longer than it is wide, and is separated from the next costal segments on either side by spaces equal in width to the width of the costa or rib.

Probably the same species referred to by Aldrich on p. 53, Geol. Surv. Ala., Bull. No. 1, 1886.

Differs from *H. pygmæa* by size, less overhang of beak, coarser, more interrupted radii, and character of radii in general. It has not the large, coarse, continuous plications of *H. ingrediens* de Greg.

Localities.—Ala.: Woods bluff; Choctaw corner.

Type.—Paleontological Museum, Cornell University.

Capulus expansus,

Pl. 11, fig's. 11, 12.

Syn. *Velutina* (*Otina*) *expansa* Whitf., Am. Jr. Conch., vol. 1, p. 265, pl. 27, fig's. 14, 15, 1865.

Leptonotis expansa Con., Am. Jr. Conch., vol. 2, p. 76, 1866.

L. expansa Tryon, Str. and Syst. Conch., vol. 2, p. 208, pl. 64, fig's. 68, 69, 1883.

Capulus complectus Ald., Geol. Surv. Ala., Bull. 1, 1886, p. 34, pl. 6, fig's. 1, 1 a.

Velutina expansa Ald., Jr. Cinn. Soc. Nat. Hist., July 1887, p. 81.

Capulus complectus de Greg., Mon. Faun. Eoc. Ala., 1890, p. 145.

Velutina (*Leptonotis*) *expansa* de Greg., *idem*, p. 156.

Colyptrea trochiformis (in part) Dall, Tr. Wag., etc., vol. 3, p. 352, 1893.

Whitfield's original description.—"Shell minute, broadly expanded; spire very low; volutions from two to three, the outer one forming the greater part of the shell; peristome continuing around the body of the volution to near the base of the columella; margin of the aperture flattened or slightly reflected; inner surface of the shell highly polished; exterior marked by irregular lines of growth. The different individuals differ somewhat in degree of expansion of the outer volution.

"Dimensions.—The largest individual seen measures .05 inch across the aperture.

"Locality.—Six miles below Prairie Bluff, Ala., in sand, filling the cavities of other shells."

Regarding this species "*Velutina expansa*" Aldrich says, *loc. cit.*: "Prof. Whitfield informs me this species was obtained from the dirt out of a large *Voluta newcombiana* Whitf. As the only locality of this species is at Bell's landing, the habitat of this form is fixed. The species has a very suspicious resemblance to a very young or embryonic *Infundibulum trochiforme* Lam."

The largest embryonic whorl is spirally lirated, and the smallest whorls are sunken or hidden by the largest, features not at all in harmony with Whitfield's "*V. expansa*," whereas the young of *C. complectus* Ald. are exactly *V. expansa* Whitfield. We have it in all stages of growth. The smallest whorls of the embryo are not sunken as in *Calyptrea trochiformis*, but appear like the smaller spirals of a very small *Natica*.

Localities.—Ala.: Woods bluff; Gregg's landing; Bell's landing; Nanafalia; 3 mi. s. w. of Thomasville. Hatchetigbee and Libson.—Aldrich.

Type.—Hall's collection.

Specimen figured.—From Woods bluff; Paleont. Mus., Cornell Univ.

***Calyptrea aperta*,**

Pl. II, fig's. 13-16.

Syn. *Trochus apertus* Sol., Foss. Hant., 1766, p. 9, fig's. 1, 2.

T. opercularis Sol., *idem*, fig. 3.

Calyptrea trochiformis Lam., Ann. du Mus., vol. I, p. 385, 1802; vol. 7, pl. 15, fig's. 3 a, b, c, d, 1806.

Trochus calyptreaformis Lam., An. sans. Vert., vol. 7, p. 558, 1822.

Calyptrea trochiformis Desh., Coq. Foss. Env. Par., vol. 2, p. 30, pl. 4, fig's. 1, 2, 3, 1824.

Infundibulum trochiformis Lea, Cont. to Geol., 1833, p. 96, pl. 3, fig. 76.

I. urticosum Con., Foss. Sh., etc., 1833, p. 32.

I. trochiformis Con., Foss. Sh., etc., 1835, p. 46, pl. 16, fig. 18.

Trochita trochiformis Con., Am. Jr. Conch., vol. 1, p. 33, 1865.

T. trochiformis Ald., Geol. Surv. Ala., Bull. 1, 1886, pp. 52, 56.

Calyptrea trochiformis de Greg., Faun. Eoc. Ala., p. 145, pl. 13, 40-47.

C. trochiformis Dall (*partim*), Tr. Wag., etc., vol. 3, p. 352, 1893.

C. aperta Cossm., Ann. Geol. et Pal., 1893, p. 26.

Solander's original description.—"Trochus (*apertus*) testa gibboso-conica exasperata obliquata subtus concava, apertura angustata.

"Primo intuitu *Patellis* assimilatur illisque quæ *Labio interno* instructæ sunt, *cfr. Linn. Syst. nat.* n. 654-658. Specimina autem perfectæ *spiram* ostendunt completam, *anfractus* licet pauciores quam in congeneribus; *Apertura* etjam magis contracta est.

"Testa magnitudine Juglandis sed depressior, sæpeque minor; tabulæ imposita conum formans gibbosiusculum, quo etjam a congeneribus differt; externe scabra, subtus lævis, concava.

"Apertura angustata, lateribus magis roduntatis quam in reliquis hujus generis." From the Barton beds of Southern England.

American Lignitic localities.—Ala.: Woods bluff; Yellow bluff; Gregg's landing; Bell's landing; Ozark; 3 mi. s. w. of Thomasville.

Type.—British Museum.

Specimens figured.—Larger specimen from Gregg's; smaller from Woods bluff; Paleontological Museum, Cornell University.

Xenophora conchyliophora,

Pl. II, fig. 17.

Syn. *Trochus conchyliophorus* Born, Mus. Cæs. Ind., 1778, p. 333.

Phorus reclusus ? Ald., Geol. Surv. Ala., 1886, Bull. 1, p. 52.

X. conchyliophora Dall, Trans. Wag., etc., vol. 3, p. 360, 1893.

I have little doubt but what Dall is right in referring the specimens from Woods bluff to this living species. Whether or not the Cretaceous specimens from Prairie bluff should be re-

ferred to the same depends on the verdict of paleontologists after better material than I have yet seen from that locality is obtained. Dall says:

"Since this group remounts in the geological scale to the Devonian, it is not so extraordinary that one of the species should persist from the uppermost Cretaceous to the present day. No differential characters have ever been recorded which would separate Morton's shell from the Eocene form which follows it, and I can assert with confidence that the latter cannot be discriminated from the Miocene and recent forms by any constant characters. If this succession be admitted, it is a strong testimony to the protective value of the device by which the members of this family defend themselves."

Lignitic locality.—Ala.: Woods bluff.

Specimen figured.—Paleontological Museum, Cornell University.

***Natica semilunata*,**

Pl. II, fig's. 18-20.

Syn. *N. semilunata* Lea, Cont. to Geol., 1833, p. 108, pl. 4, fig. 93.

? *N. perspecta* Ald., Geol. Geol. Surv. Ala., Bull. I, p. 56.

N. epiglottina, et al. of de Greg., Mon. Faun. Eoc. Ala., p. 148, etc.

N. minor Coss., Ann. de Geol. et de Pal., 1893, p. 25.

N. semilunata Coss., Ann. de Geol. et de Pal., 1893, p. 25.

N. semilunata Dall, Trans. Wag., etc., vol. 3, p. 364.

Lea's original description.—"Shell subglobose, smooth; substance of the shell rather thin; spire slightly elevated; suture rather impressed; columella but slightly thickened, the callus being reflected at the middle of the umbilicus; umbilicus large and grooved; whorls five, inflated, slightly flattened below the suture; mouth semi-lunate, about two-thirds the length of the shell. Length .4, breadth 7-20 of an inch." From Claiborne, Ala.

The Lignitic beds offer greater varieties of this species than the Claiborne sand does. Dall is doubtless right when he says: "In this species the young has the umbilical rib very distinct, but in completely adult specimens the rib has frequently become so obsolete as to have practically vanished." A large and probably more or less diseased form is shown by fig. 19, which still retains a very sharply defined and large umbilical rib. This, however, is a rare exception.

Typical small specimens occur at Hatchetigbee, with strong umbilical ribs, much stronger than that represented by fig. 18, from Woods bluff. Larger specimens with not the slightest trace of this rib are common in the Lignitic. One is represented by fig. 20.

Sometimes the ribless, more elevated, smaller specimens have something of the appearance of broad varieties of *N. eminula*, but a glance at the suture will distinguish the two: *semilunata* is slightly flattened or shouldered just below the suture, while in *eminula* there is no trace of such a character and the lower whorls are tightly appressed at a small angle against the whorls above. There is even a slight indentation sometimes in *eminula* where the shoulder occurs in *semilunata*.

Lignitic localities.—Ala.: Gregg's landing; Woods bluff; 3 mi. s. w. of Thomasville; 4 miles above Hamilton bluff; Hatchetigbee.

Tex.: Sabinetown.

Type.—Lea collection, Acad. Nat. Sci. Phila.

Specimens figured.—Paleont. Mus., Cornell Univ.

Natica (*Sigaticus*) *clarkeana*,

Pl. II, fig. 21.

Syn. *Sigaretus* (*Sigaticus*) *clarkeanus* Ald., Jr. Cinn. Soc. Nat. Hist., July 1887, p. 83.

Sigaretus (*Sigaticus*) *clarkeanus* Ald., Bull. Am. Pal., vol. I, p. 68, pl. 2, fig. 16, 1895.

Signatus (*Eonaticina*) *clarkeanus* Dall, Trans. Wag., etc., vol. 3, p. 380, 1893.

Aldrich's original description.—"Shell rather thick, rounded, whorls five, suture linear, surface of body whorl with a large number of impressed lines almost obsolete in the center, but numerous and distinct above and below; umbilicus striate within; aperture lunate, inner lip covered with a callus, thickening towards the posterior part. Locality: Choctaw Corner and Hatchetigbee bluff, Ala. This peculiar shell possesses the form of *Natica*, but the lines of *Sigaretus*."

This should not be referred to *Sigaretus*; its form, thick shell, umbilical features are all of *Natica*, not *Sigaretus*. The faintness of the striation on this species sometimes suggests a close relationship with some forms of *N. eminula*, which is generally

more or less striate above and below. *Eonaticina* is by definition a sharp-spined, thin shell.

Localities.—Ala.: Choctaw corner; Woods bluff; 4 mi. above Hamilton bluff, Ala. river; Hatchetigbee.

Tex.: Sabinetown.

Type.—Aldrich's collection; from Choctaw corner.

Specimen figured.—Hatchetigbee; Paleont. Mus., Cornell University.

***Natica eminula* var.**

Pl. II, fig. 22.

Syn. *N. eminula* (See Bull. Am. Pal., vol. I, p. 233).

N. parva var.; Ald., Geol. Surv. Ala., Bull. I, p. 56.

N. decipiens Ald., Geol. Surv. Ala., Bull. I, p. 56.

N. eminula Ald., Geol. Surv. Ala., Bull. I, p. 58.

This form differs considerably from true *eminula* from the Claiborne sands, but its general form and appearance is such as to suggest a close relationship to the latter. *N. eminula* at Claiborne differs somewhat in its proportions, but it is generally thin, with only a slight tendency to form a columellar callosity. This form is thicker, wider in proportion to its height; with a callosity showing an indentation or notch above—a characteristic which, however, I have noticed in Jackson specimens from White bluff, Ark. These differences are probably due to difference of environment. These differential characteristics are carried slightly further in *N. marylandica* Con.; i. e., *marylandica* is lower or wider than the Lignitic specimens of the South and are apt to have a larger umbilicus. *N. marylandica*, too, sometimes attains a larger size than any of its southern representatives. If *marylandica* were the older name I would be inclined to place this Lignitic form as a variety of that species, for the inter-relationship of the two is close and well marked.

It is fortunate that *eminula* and *marylandica* were proposed for the extremes of the series if the names are to be employed as denoting distinct species. But this leaves us in doubt about the proper nomenclature of these intermediate forms.

Lignitic localities.—Ala.: Woods bluff; Gregg's landing; Yellow bluff; Bell's landing; 4 mi. above Hamilton bluff; Hatchetigbee bluff; Tuscahoma landing; near mouth of Bashi creek.

Tex.: Sabinetown.

Specimen figured.—From Bell's landing; Paleont. Mus., Cornell Univ.

Natica magno-umbilicata, ■

Pl. II, fig. 23.

Syn. *N. magno-umbilicata* Lea, Cont. to Geol., 1833, p. 109, pl. 4, fig. 94.

N. magno-umbilicata Ald., Geol. Surv. Ala., Bull. I, 1886, p. 51.

N. magno-umbilicata Dall, Trans. Wag., etc., vol. 3, p. 366.

Lea's original description.—"Shell subglobose, smooth; substance of the shell thin; spire depressed, rounded; suture small; columella very slightly thickened, the callus being small and reflected above the middle of the umbilicus; umbilicus very wide, grooved; whorls three, inflated, with longitudinal folds on the superior part; mouth semi-lunate, nearly three-fourths the length of the shell." Claiborne, Ala.

The Lignitic form differs very materially from the typical Claibornian. It is larger, thicker, with a higher spire, with only traces of plications below the sutures, and no columellar callosity. It will doubtless some day be referred to a distinct species.

Lignitic localities.—Ala.: Woods bluff. Aldrich finds it also at Choctaw corner and Butler.

Type.—Academy of Natural Sciences, Philadelphia.

Specimen figured.—Paleontological Museum, Cornell University.

Natica (Neverita) onusta,

Pl. II, fig's. 24-26.

Syn. *N. (Polinices) onusta* Whitf., Am. Jr. Conch., vol. I, p. 264, 1865.

N. onusta Ald., Geol. Surv. Ala., 1886, Bull. I, p. 56.

N. onusta Dall, Trans. Wag., etc., vol. 3, p. 368.

N. onusta Harris, Bull. Am. Pal., vol. I, p. 232, pl. 22, fig. 17.

Whitfield's original description.—See Bull. Am. Pal., vol. I, p. 232.

Dall is inclined to think this is the adult form of *aperta*. He cites in favor of this idea the fact that "*N. onusta* by Whitfield, otherwise identical with his *N. aperta*, has the umbilicus plumply filled by a rounded callus. One specimen in the National Collec-

tion, among those which had been referred to as *N. aperta* Whitfield, has an incipient callus forming, and I am led to suspect that this species delays forming a callus until the shell is fully grown and then adds it, and that therefore *N. aperta* and *N. onusta* should be consolidated under the last mentioned specific name." Opposed to this view are the facts: that even the small *onusta* are provided with a callus; that their shell substance is thicker than in *aperta*; that there is scarcely ever a trace of a shoulder just below the suture in *onusta*, while it is strongly developed in *aperta*; *aperta*'s spire is generally much more elevated and pointed.

This we believe to be a forerunner of *N. limula*. The latter species was recorded in Bull. 4 as coming from the Midway beds. Having up to this time seen no other specimens from so low a horizon, or even from the Lignitic, we are inclined to suspect an error in labelling somewhere. *N. onusta* varies somewhat in form, but no more than does *limula*. It is distinguished from the latter by its umbilical features only. Its umbilicus is very broadly spreading, hence giving the lower margin of the body whorl a more or less carinated appearance. The greater part of this umbilicus is filled by a callosity that has no transverse bisecting depressed line across it, as *limula* does. It is typically developed at Yellow bluff.

Localities.—Ala.: Yellow bluff; Gregg's landing; Bell's landing; Woods bluff; Nanafalia? Aldrich adds Tuscahoma.

Specimens figured.—Large depressed form, Yellow bluff; very elevated form, Gregg's landing; smaller specimen, Bell's landing. All in Paleontological Museum, Cornell University.

***Natica aperta*,**

Pl. II, fig. 27.

Syn. *Natica* (*Girodes*) *aperta* Whitf., Am. Jr. Conch., vol. 1, p. 265, 1865.

N. aperta Ald., Geol. Surv. Ala., 1886, Bull. 1, p. 56.

N. (Neverita) aperta Dall., Trans. Wag., etc., vol. 3, p. 368.

Whitfield's original description.—"Shell very oblique, palulose; spire low; volutions three, slightly flattened on the top, with a depression just below, and sharply rounded on the lower part; umbilicus very large; upper part of the columellar lip reflected over the umbilicus; callus, none; aperture large, semi-lunate;

surface marked by lines of growth.

“Locality.—Six miles above Claiborne, Ala.”

Localities.—Ala.: Yellow bluff; Bell’s landing; Gregg’s landing (the most abundant here); Lower Peach Tree, and Tusahoma.

Type.—Hall’s collection.

Specimen figured.—From Gregg’s landing; Paleontological Museum, Cornell University.

Natica (Lacunaria) erecta,

Pl. II, fig. 28.

Syn. *Natica erecta* Whitfield, Am. Jr. Conch., vol. I, p. 264, pl. 27, fig. II, 1865.

Whitfield’s original description.—“Shell subglobose; spire elevated; volutions five, ventricose; suture well marked; substance of the shell thin; aperture large, obliquely ovate; outer lip thin and sharp; columellar lip slightly thickened and grooved, without callus; umbilicus small, partly concealed by an extension of the columellar lip; surface of the shell polished.

“Localities.—Six miles above Claiborne, on the west side of the river, and ten miles below Prairie bluff, Ala.”

Aldrich has kindly given me the specimen figured. I have recently found in our collections several specimens of this species, all from Bell’s, and of a peculiar horn color.

Type.—Hall’s collection.

Specimen figured.—From Bell’s landing; Harris’ collection.

Natica (Lacunaria) alabamiensis,

Pl. II, fig. 29.

Syn. *N. (Griodes) alabamiensis* Whitf., Am. Jr. Conch., vol. I, p. 265, pl. 27, fig’s. 9, 10, 1865.

Lacunaria alabamiensis Con., Am. Jr. Conch., vol. 2, p. 77, 1886.

Natica alabamiensis Ald., Geol. Surv. Ala., 1886, Bull. I, p. 56.

Ampullina alabamiensis Cossm., Ann. de Geol. et. Pal., 1893, p. 26.

Natica (Griodes) alabamiensis Har., Bull. Am. Pal., vol. I, p. 231, pl. 22, fig. 14, 1896.

Whitfield’s original description.—(See this publication, vol. I, p. 231).

Lignitic localities.—Ala.: Gregg's and Bell's landings; Tuscahoma, and Lower Peach Tree.

Specimen figured.—Gregg's; now in Paleont. Mus., Cornell Univ.

Ampullina recurva var.

Pl. 12, fig. 1.

Syn. *Natica mississippiensis* Heilp., Proc. Ac. Nat. Sci. Phila., 1880, p. 365. Name in list only.

Natica mississippiensis (umbilical variety) Ald., Geol. Surv. Ala., Bull. 1, p. 56.

Natica recurva Ald., *idem*, 1886, p. 33, pl. 5, fig. 10.

Natica dumblei Heilp., Proc. Ac. Nat. Sci. Phila., 1890, p. 404, pl. 11, fig. 3.

Ampullina crassatina var. *mississippiensis* (in part) Dall, Trans. Wag., etc., vol. 3, p. 375.

Aldrich's original description.—"Shell large, globose, smooth, whorls six, spire low; suture channeled, that part of the whorl within this groove concave, rising to a shoulder. Body whorl very large, flattened on upper part, abruptly rounded below the umbilicus; aperture semilunar, rounded anteriorly and narrowed at the posterior part; callus thick, spreading over the body whorl and partially covering the umbilicus. Umbilicus large, deep, striated within, a thickened callus or rib proceeding from the lower edge of the outer lip, and rounding into the umbilicus.

"*Locality.*—Lisbon, Ala. The type shows on the body whorl traces of numerous revolving color lines."

With all of Conrad's types before me I cannot see how our Lignitic specimens can be referred to *N. mississippiensis* Con. The latter species is smooth exteriorly, showing almost no traces of growth lines; practically no umbilicus, and what there is, is obliterated by the labial callosity; no sign of the "thickened callus or rib proceeding from the lower edge of the outer lip and rounding into the umbilicus," as mentioned under *recurva*.

The Lignitic variety of *recurva* is generally smaller than the type specimen. The "rib" just referred to does not generally make quite so wide a sweep, but proceeds more directly up into the umbilicus in the varietal form. *N. recurva* varies greatly at its type locality so far as suture channeling and height of spire are concerned.

Lignitic localities.—Ala.: Hatchetigbee; Woods bluff; Bell's landing; Yellow bluff. Gregg's landing also.—Aldrich.

Variety figured.—From Hatchetigbee; Lea Memorial Collection.

Sigaretus declivus,

Pl. II, fig. 30.

Syn. *S. declivus* Con., Foss. Sh. Tert., etc., Nov. 1833, p. 45.

Natica striata (in part) of Lea, Cont. to Geol., Dec. 1833, p. 105, pl. 4, fig. 88.

Catinus bilix var. *declivus* Con., Am. Jr. Conch., vol. 6, p. 314, pl. 13, fig. 2, 1870.

S. declivus Dall, Trans. Wag., etc., vol. 3, p. 378.

Conrad's original description.—"Obliquely suboval, with distinct impressed and intermediate fine striæ; spire slightly prominent; umbilicus small, partly closed by the callus; aperture patulous." Claiborne, Ala.

Lignitic localities.—Ala.: Woods bluff; Bell's landing; Gregg's landing.

Type.—Acad. Nat. Sci., Phila.

Specimen figured.—Woods bluff; Paleont. Mus., Cornell Univ.

Sigaretus bilix,

Pl. II, fig. 31.

Syn. *S. bilix* Con., Am. Jr. Sci., vol. 23, p. 344, Jan. 1833.

Natica striata Lea, Cont. to Geol., Dec. 1833, p. 105.

Catinus bilix Con., Am. Jr. Conch., vol. 6, p. 314, pl. 13, fig. 4, 1870.

Sigaretus bilix Dall, Trans. Wag., etc., p. 378 of vol. 3.

Conrad's original description.—"Shell obliquely oval, convex, with fine crowded striæ revolving in pairs. Length, one-third of an inch.

"*Locality*.—Claiborne, Ala. *London Clay*."

So far as our observation goes Dall is correct in retaining both names *bilix* and *declivus* as of specific rank. Lea, and afterwards Conrad, referred the two to the same species, though Conrad still retained *declivus* as a varietal designation. *Bilix* is rotund; *declivus* is oblique. So far we have had no trouble in separating the two species.

Lignitic locality.—Ala.: Woods bluff. Aldrich adds Choctaw corner and Butler.

Type.—Acad. Nat. Sci., Phila.

Specimen figured.—Woods bluff; Paleont. Mus., Cornell Univ.

Adeorbis liniferus,

Pl. 12, fig. 2.

Syn. *Solariorbis subangulatus* (Mr. var.) Ald., Bull. Am. Pal., vol. 2, p. 172, pl. 5, fig. 8, 1897.
S. liniferus Ald., *idem*.

Aldrich (*loc. cit.*) says of this "*subangulatus*" var.: "Shell small, depressed, whorls five, rapidly increasing in size; surface covered with fine revolving lines, umbilicus deep; aperture approaching quadrate, suture distinct.

"This agrees with Meyer's description and figure. If new, however, it may be called *S. liniferus*. Type [of *subangulatus*] was obtained at Jackson, Miss."

(See *Teinostoma subangulata*.)

Locality.—Ala.: Choctaw corner.

Type of liniferus.—Aldrich's collection.

Adeorbis sylværupis n. sp.

Pl. 12, fig's. 3, 4.

Specific characterization.—Size and general features as indicated by the figures; whorls about five; surface depressed just exterior to the suture; spiral lines, raised, sharp, increasing in strength from suture to the peripheral, the eighth line, which carinates the whorl; below a sub-carina and between it and the umbilicus three more small spirals; umbilicus large, smooth. Between the carinal and sub-carinal lines there is generally a more or less conspicuous revolving line, though no trace of it is to be seen on the type specimen.

Differs from *A. exacuus* Con. by (1) the presence of two raised spirals in the subsutural depression, in place of a large number of fine hair lines, (2) the entire absence of hair line spirals between the high raised lines, by (3) the lack of the broad, flattened base of the body whorl of *exacuus*, (4) the presence of three well-developed spirals and a sub-carina beneath.

In general appearance this is like *A. delphinuloides* Mr., though that has the striation of *exacius*.

Locality.—Ala.: Woods bluff. Var. fig's. 4, 4 a, from Hatch-etigbee.

Type and specimen figured.—Paleont. Mus., Cornell Univ.

Varietal form.—Lea Memorial collection, Phila. Acad.

Adeorbis dalli n. sp.

Pl. 12, fig. 5, a.

Specific characterization.—Size and general form as indicated by the figures; spire low; suture distinct and with a depression immediately without; mouth nearly circular, very slightly angular at the termination of a faint ridge separating the umbilicus from the remainder of the body whorl; umbilicus very broad; the whorls all plainly visible from below. The surface is striate, as indicated by the figure.

This was at first taken for Lea's "*Turbo lineata*," but it is much smaller, much more depressed, and with an enormous umbilicus, quite different from Lea's species.

Locality.—Ala.: Woods bluff.

Type and specimen figured.—Paleont. Mus., Cornell Univ.

Scala,

Pl. 12, fig. 6.

The Eocene *Scalae* are in a somewhat confused state and I accordingly hesitate to name mere fragments like this, though it is evidently very distinct from the other two species figured.

Localities.—Ala.: Yellow bluff.

Tex.: Sabinetown.

Specimen figured.—Lea Memorial collection.

Scala exquisita,

Pl. 12, fig's. 7, 7 a.

Syn. *S. exquisita* Ald., Bull. Am. Pal., vol. 2, p. 180, pl. 2, fig's. 7, 7 a.

For Aldrich's description, see the above reference.

Locality.—Gregg's landing, Ala.

Figures.—Same as in vol. 2, pl. 2.

Scala,

Pl. 12, fig. 8.

Immature specimen from Woods bluff, showing features very distinct from the others, though too immature for certain identification. In the Paleontological Museum, Cornell University.

Mathilda leana,

Pl. 12, fig. 9.

Syn. *Tuba* (*M.*) *leana* Ald., Bull. Am. Pal., vol. 2, p. 180, pl. 2, fig. 2.

For Aldrich's description, see the above reference.

Locality.—Choctaw corner.

Figure.—Same as in vol. 2, etc.

Turbonilla, sp.

Pl. 12, fig. 10.

I have but one specimen of this species and that is very small and apparently eroded, so I defer referring it to any known species or describing it as a new one. It is from Bell's landing, Ala.

Specimen figured.—Paleont. Mus., Cornell Univ.

Eulima (Subularia) cainei n. sp.

Pl. 12, fig. 11, a.

Specific characterization.—Size and general form as indicated by the figures; whorls nine, the upper four with well-marked suture; below, however, the suture is not sharply and definitely incised; mouth long, narrow, outer lip sinuous; columella with a callus extending nearly its whole length; body whorl angular medially, other whorls straight-sided.

Resembles most closely *Eulima fusus* Dall, a recent shell of the s. E. coast of the U. S.

Locality.—Ala.: Woods bluff.

Tyre.—Paleont. Mus., Cornell Univ.

Eulima exilis,

Pl. 12, fig. 12.

Syn. ? *Pasithea lugubris* Lea, Cont., etc., 1833, p. 101, pl. 4, fig. 81.

E. exilis Gabb, Jr. Acad. Nat. Sci. Phila., vol. 4, p. 385, pl. 67, fig. 43, 1860.

Gabb's original description.—"Elongate slender, polished; whorls eight; apex acuminate, mouth small, outer lip nearly straight. Dimensions: Length, .23 in.; width of body whorl, .05 in.; length of mouth, .05 in." From Caldwell, Texas.

The broken specimen now in the Philadelphia Academy's collection, supposed to be the type, does not agree in all respects with Gabb's figure and description. I am not sure of the present identification, having only the imperfect specimen figured.

Specimen figured.—Woods bluff, Ala. Now in Paleont. Mus., Cornell Univ.

Niso umbilicata,

Pl. 12, fig. 13.

Syn. *Pasithea umbilicata* Lea, Cont. to Geol., 1833, p. 103, pl. 4, fig. 85.

Niso umbilicata D'Orb., Prod. 2, p. 318, t. 92.

(*Bonellia lineata* Con., Jr. Phila. Ac., 1st. Ser., vol. 8, though referred to *umbilicata* Lea by Con., Am. Jr. Conch., vol. 1, p. 29, is doubtless very distinct, presumably from the Miocene of Maryland.)

Niso umbilicata de Greg., Mon. Faun. Eoc. Ala., 1890, p. 162, pl. 16, fig's. 7, 8.

Lea's original description.—"Shell elevated above, rounded below, sub-carinate, polished; substance of the shell thin; apex acute; suture linear; umbilicus large; whorls nine, flattened; mouth subovate, acutely angular above, one-fifth the length of the shell; columella incurved at base; margin entire. Length, .2 in.; breadth, .1 in. * * * Its umbilicus is wide, with a large spiral groove. On some of the whorls the line of growth may be indistinctly seen."

Lea's specimen was small and imperfect. The "spiral groove" does not seem to occur in our Claiborne specimens, but high up in the umbilicus there is sometimes a longitudinal plaiting.

Lignitic localities.—Ala.: Woods bluff; Yellow bluff.

Specimen figured.—From Woods bluff; Paleont. Mus., Cornell Univ.

Type.—Lea collection, Phila. From Claiborne.

Eulimella tenua,

Pl. 12, fig. 16.

Syn. *Eulima tenua* Gabb, Jr. Ac. Nat. Sci. Phila., vol. 4, p. 386, pl. 67, fig. 45, 1860.

Gabb's description.—"Very elongated and narrow; whorls nine, rounded; suture distinct; mouth very small, oval.

"Dimensions.—Length, .15 in.; width of body whorl, .025 in.; length of mouth, .02 in.

"*Locality*.—Caldwell, Tex."

The type now in the Phila. Acad. I have figured and it will be given in the forthcoming bulletin on the Lower Claiborne fossils. Specimens from the Lignitic of Alabama show a very faint trace of a fold near the top of the straight columella.

Lignitic locality.—Ala.: Woods bluff.

Specimen figured.—Paleont. Mus., Cornell Univ.

***Syrnola dalli* var.**

Pl. 12, fig. 14.

Syn. ? *Obeliscus perexilis* Con., Am. Jr. Conch., vol. 1, pp. 144, 211, pl. 20, fig. 2, 1865.

Syrnola dalli Coss., Ann. de Geol. and Pal., 1893, p. 22, pl. 1, fig. 28.

Cossmann's original description.—"Testa angusta, multispirata, lævigata, anfractibus parum elevatis; sutura profunda discretis; ultimo ad basim valde rotundato; apertura parva; columella biplicata.

"Petite coquille étroite, allongée, composée d'un grand nombre de tours étroits et lisses, que séparent des sutures profondément gravées, mais non canaliculées; le dernier n'est pas grand, et est arrondi et très convexe à la base, sans aucune trace d'ombilic; ouverture petite, rhomboïdale, columella armée de deux plis presque égaux, un peu obliques et saillants."

I do not feel altogether sure of the specific difference between *perexilis* Con. and *dalli* Cassman. Regarding a very similar form I found in the Lower Claiborne of Texas, I wrote in my still unpublished report: "By examining a large number of specimens from Claiborne it will be observed that some show signs of a rudimentary plait below the strong one noted by Conrad. This feature is noticeable in the Texas specimen."

Cassmann says the plaits in *dalli* are almost equal. Again, the suture as figured by him are not the same as in our specimen. Yet both most probably belong to the same species.

Lignitic locality.—Ala.: Woods bluff.

Type.—Cossmann's collection.

Specimen figured.—Paleont. Mus., Cornell Univ.

Syrnola trapaquara,

Pl. 12, fig. 15.

Syn. ? *S. propeacacula* Coss., Ann. Geol. et Pal., 1893, p. 23, pl. 1, fig. 29.

S. trapaquara Har., Proc. Ac. Nat. Sci. Phila., 1895, p. 77, pl. 8, fig. 10.

Odontostomia insignifica Ald., Bull. Am. Pal., vol. 2, p. 179, pl. 2, fig. 8, 1897.

Harris' original description.—"Size and general form as indicated by the figure; whorls seven; 1 small, sinistral; 2-7 polished, slightly tumid, with a well-marked suture; aperture moderate, striate within; one strong plait on the columella."

Described from Lower Claiborne beds in Texas.

I regard *insignifica* as exactly synonymous with *trapaquara*. *S. propeacacula* is, however, quite a different form, if the figure Cossmann gives is exact. But from some points made in the description I am somewhat inclined to think the figure not entirely true to nature. Hence the doubt expressed in the synonymy.

Lignitic localities.—Ala.: Woods bluff; Gregg's landing.

Type.—Texas State Museum.

Liotia granulata,

Pl. 12, fig. 17.

Syn. *Solarium granulatum* Lea, Cont. to Geol., 1833, p. 122, pl. 4, fig. III.

S. tricostratum Con., Foss. Sh. Tert. Form., 1835, p. 50, pl. 17, fig. 10.

S. granulatum Ald., Geol. Surv. Ala., Bull. 1, 1886, p. 50.

L. (Solarium) granulata Dall, Trans. Wag., etc., vol. 4, p. 411.

Lea's original description.—"Shell conical, flattened below, with seven or eight transverse granulate lines, between which it is furnished with oblique striæ; substance of the shell thick, suture furrowed; umbilicus narrow, largely crenate without, striate within; whorls five; mouth nearly round, subangular above; outer lip crenate. Length .2, breadth .2 of an inch." Described from Claiborne, Ala.

The best Lignitic specimen we have is from Woods bluff, and is shown by the figure. It varies slightly from the Claiborne type in having a little more prominent granules above, but not quite so prominent near the umbilicus. The shell is thick and shows distinctly where the operculum fitted in. Also at Hatch-etigbee.

Type.—Acad. Nat. Sci. Phila. Lea collection.

***Solariella louisiana*,**

Pl. 12, fig. 18.

Syn. *Solarium elegans* var. Ald., Geol. Surv. Ala., Bull. 1, 1886, pp. 50, 51.

S. louisiana Dall, Trans. Wag., etc., vol. 3, p. 407, 1893.

S. sylværupis Har., Proc. Ac. Nat. Sci. Phila., 1896, p. 477.

S. louisiana Dall, Trans. Wag., etc., vol. 3, pl. 23, fig's. 1, 1 a, 1898.

Dall's original description.—"Shell small, subconical, with five or six whorls; nucleus small; whorls rounded, with a flattened space in front of the suture, which is distinct and sometimes even slightly channeled; the flattened area is bounded anteriorly by an elevated spiral thread, which especially on the earlier whorls is more or less distinctly beaded; besides this the surface is sculptured with spiral grooves separated by about equal interspaces and crossed obliquely by numerous impressed lines, rather evenly spaced and in harmony with the lines of growth; the sculpture throughout is stronger on the upper part of the whorls and on the earlier whorls; on the last whorl it is more or less obsolete in nearly all the specimens; the periphery is evenly rounded; the base slightly flattened; the umbilicus large and funicular, its walls sculptured in both directions, the spirals distinctly beaded; the umbilical carina is crenate, with a narrow sulcus formed by two or three impressed lines, outside of the carina; aperture very oblique, rounded, thin-edged, hardly interrupted by the body whorl or umbilical carina. Altitude of two specimens, A and B, A 7, B 5.5; max. diam., A 8.5, B 7.00 mm.

"This species has been generally confounded with *S. elegans*, which is a less elevated shell, with a scalar umbilicus and generally with several elevated, rather distant spirals and more prominent sculpture."

The shell is beautifully nacreous just beneath the surface layers, which are often more or less exfoliated. When

young the line just outside of the umbilical carina is very deep and wide; just outside of this furrow there is a second deeply-beaded band separated from the rest of the base of the whorl by a second but less deeply incised line. In young specimens the umbilical carina projects downward far below the peripheral margin of the body whorl.

I overlooked Dall's description (without figure) of this species given in his "Tertiary Fauna of Florida" and gave another name, *syllærupis*. In part IV. of Dall's work, just published (1898), I find it figured. It is true that a fossil is not now entitled to a name in scientific literature until it is figured. But inasmuch as Dall refers to a plate and figure in his earlier work, this is taken as proof that a figure was drawn then, though published in 1898. Courtesy would doubtless therefore permit the use of the name *S. louisiana*.

Lignitic localities.—Ala.: Hatchetigbee; Woods bluff; 4 mi. above Hamilton bluff.

Type.—National Museum.

Specimen figured.—Lea Memorial Collection, Acad. Nat. Sci., Phila.

Cyclostrema aldrichi, n. sp.

Pl. 12, fig's. 19, a.

Specific characterization.—Size and general form as indicated by the figures; the spire depressed, though not so concave as the under or umbilical side of the shell; costæ somewhat irregularly placed and at their junction with the spirals becoming somewhat nodular, especially on the uppermost and lowermost portions of the body whorl; the latter very slightly carinated above.

Types and specimens figured.—Ala.: Woods bluff. Paleont. Mus., Cornell Univ.

Teinostoma subangulatus,

Pl. 12, fig's. 20-22.

Syn. ? *Adeorbis subangulatus* Meyer, Bull. 1, Geol. Surv. Ala., 1886, p. 67, pl. 2, fig. 28.

Meyer described his *A. subangulatus* from Jackson, Miss., as follows: "Discoid; whorls five, rapidly increasing in size; margin somewhat angular; basal part of margin rounded; umbilicus

deep; suture distinct; surface with revolving lines, indistinct near the margin; aperture irregularly elliptical.

"*Adeorbis depressus* Lea sp. (*Teinostoma rotula* Heilpr.) from Claiborne has the umbilicus nearly closed, a regularly rounded margin, a more developed ornamentation, and is larger."

Having just examined the type of *rotula* kindly sent me from the Am. Mus. Nat. Hist., I am inclined to think it an extremely smooth variety of *depressus*, for its umbilical rib is the same and on the base near the aperture there are traces of spiral punctuate lines.

Not having the type of *subangulatus* for comparison, it is with great doubt that these Lignitic forms are referred to Meyer's species. Instead of being smaller than *depressus* they are in some instances of two or three times the dimensions of that species. They vary greatly in angulation or carination of the body whorl. They are generally rather finely striate or smooth above and more strongly striate below. There is a thickening of the middle portion of the obliquely-cut columella, but no distinct umbilical rib as seen in species like *depressus*. The Lea Memorial specimen from Bell's (fig. 20) is flattened and smooth above; our Gregg's landing specimen (fig's. 21, a) is more bicarinate, with higher spire and striate above and below; the Sabinetown fragment (fig's. 22, a, b) is more callous about its umbilicus and is smooth and shining all over.

Aldrich's "*Adeorbis depressus* Lea" and "*Teinostoma subrotunda* Mr.," from Bell's landing (Bull. 1, Geol. Surv. Ala., p. 87), come in near here somewhere.

Fissurella alabama, n. sp.

Pl. 12, fig's. 23, a.

Specific characterization.—Size and general appearance as figured; low; marked exteriorly by about eighteen primary radii, between which there are two or three secondary and sometimes an equal number of tertiaries. Concentric striae strong, raised, causing folds or granulations at their intersections with the strong ribs.

Locality.—Ala.: Gregg's landing.

Type and specimen figured.—Lea Memorial Collection; Phila. Acad. Nat. Sci.

Pteropoda.

Spirialis choctavensis,

Pl. 12, fig. 24.

Syn. *Physa choctavensis* Ald., Jr. Cinn. Soc. Nat. Hist., July 1887, p. 83.

Spirialis choctavensis Ald., Bull. Am. Pal., vol. 1, p. 57, pl. 3, fig. 10, 1895.

Aldrich's original description.—"Shell thin, minute, rather obtuse and broad, whorls probably five, somewhat shouldered, outer lip slightly patulous, inner lip reflected and reaching well upon the body wall, surface showing lines of growth only.

"*Locality*.—Choctaw corner, Ala., Woods bluff group.

"Resembles somewhat very young specimens of the common *Physa heterostropha* Say., but presenting differences enough to constitute a distinct species.

"Five specimens found."

The specimen figured is in the Cornell Univ. Paleont. Mus., from Woods bluff.

Spirialis elongatoidea,

Pl. 12, fig. 25.

Syn. *Physa elongatoidea* Ald., Jr. Cinn. Soc. Nat. Hist., July 1887, p. 83.

Spirialis elongatoidea Ald., Bull. Am. Pal., vol. 1, p. 57, pl. 3, fig. 9, 1895.

Aldrich's original description.—"Shell thin, minute, strongly sinistral, whorls five, smooth, suture strongly impressed and very oblique to the axis, aperture almost quadrate, inner lip meeting the parietal wall abruptly and reaching down nearly straight. Locality same as previous species. This form is peculiar in departing from the American living types and being more elongate than any here known. It might be mistaken for a species of *Limnea* if it was not sinistral. The only specimen found is a young shell."

No specimens have been found in our collections. The figure is of Aldrich's type.

Cephalopoda.

Nautilus fragment,

Pl. 12, fig. 26.

From Woods bluff, Ala.



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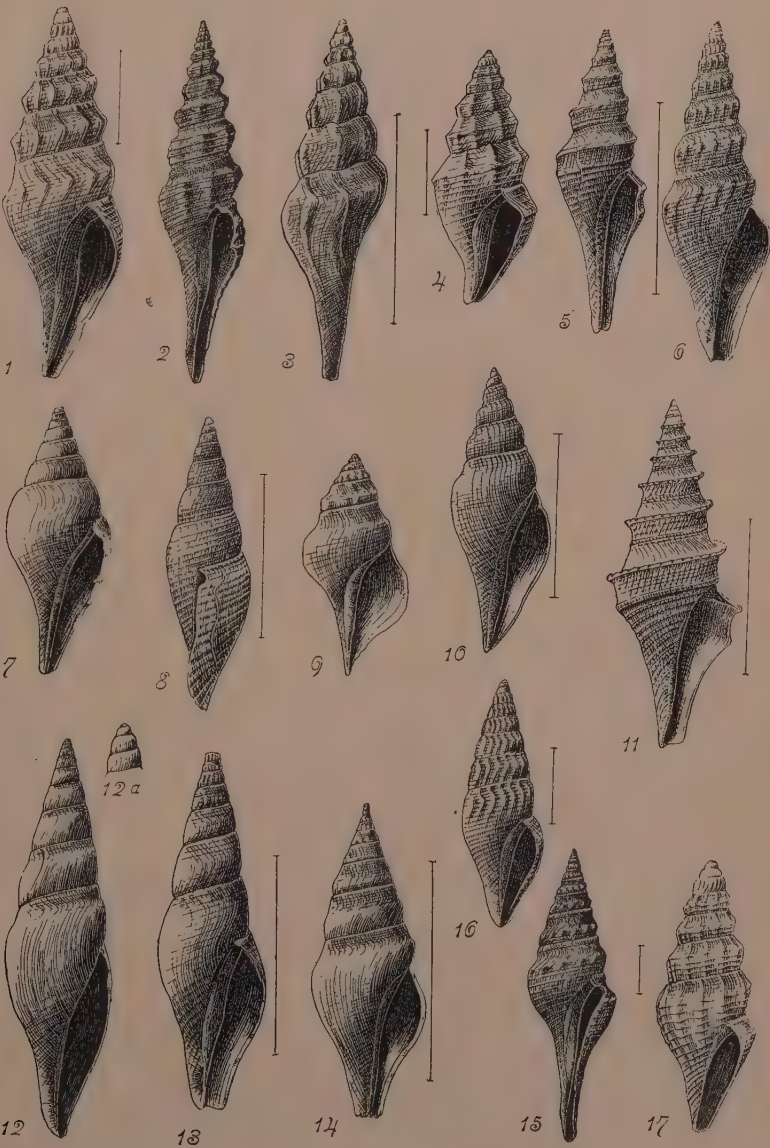


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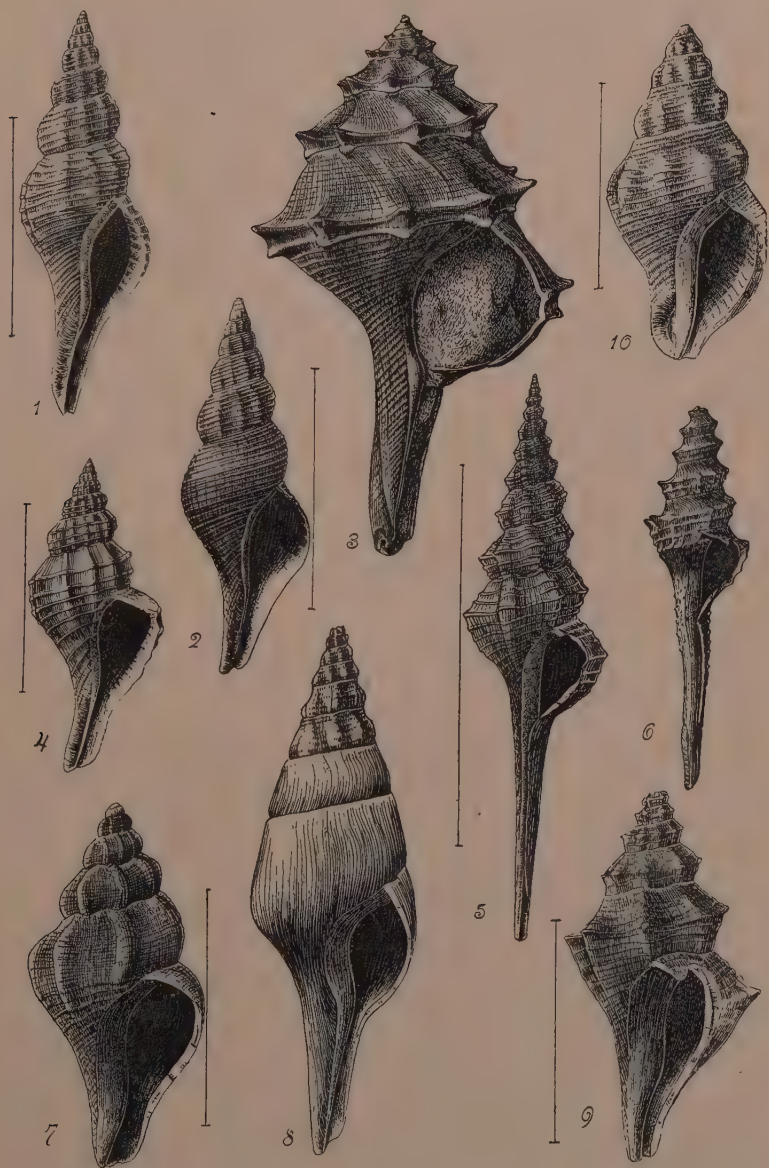


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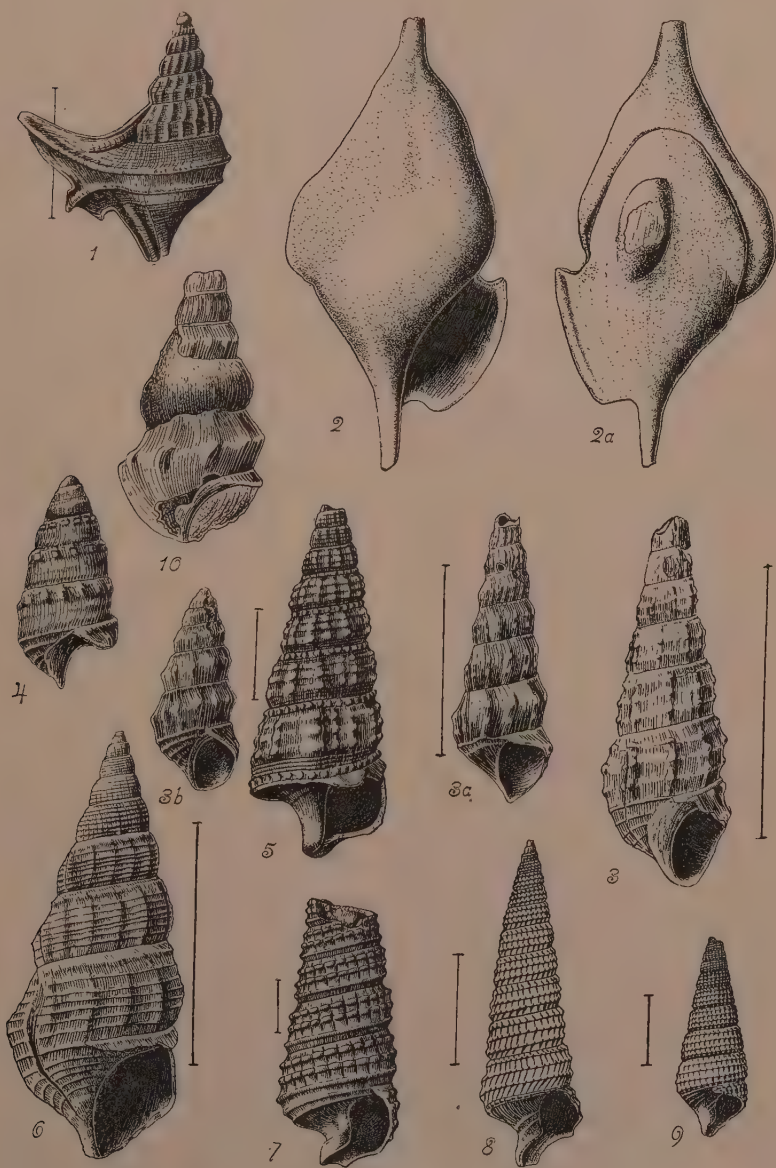


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